

The EQW National Employer Survey

Designed by the National Center on the Educational Quality of the Workforce

Administered by the Bureau of the Census

Sponsored by the Office of Educational Research and Improvement, U.S. Department of Education

First Findings

A Reality Check

The National Center on the Educational Quality of the Workforce (EQW) has completed the first analysis of data from the EQW National Employer Survey (EQW-NES), conducted in conjunction with the Bureau of the Census. First findings from the EQW-NES provide nothing short of a "reality check," an opportunity to provide a baseline from which to document the practices and expectations of employers in their search for a skilled and proficient workforce. In a climate in which anecdote and best practice often serve as fact, the EQW-NES gives direct answers to direct questions, dispelling and corroborating some commonly touted beliefs about employer practices. As employers are increasingly asked to invest in more purposeful school-to-work transitions, the EQW-NES asks them to report their willingness to invest in workers' skills, to assess their current and future skill needs, and to indicate the extent to which they rely on partnerships with schools to supply the necessary skills of new workers.

The work reported herein was supported under the Educational Research and Development Center program, agreement number R117Q00011-91, CFDA 84.117Q as administered by the Office of Educational Research and Improvement, U.S. Department of Education. The findings and opinions expressed in this report do not reflect the position or policies of the Office of Educational Research and Improvement or the U.S. Department of Education.

The findings and opinions expressed here do not reflect the position or policies of the Bureau of the Census.

Call 1-800-437-9799 or e-mail "eqw-requests@irhe.uepn.edu" for more information.

First Findings from the EQW-NES

In this document we present employers' answers to many of the key questions asked by the EQW-NES. The questions and answers are grouped into three broad categories which, like the EQW Triangle (see page 3), link employers, workers, and educational suppliers: employer practices; employers' assessment of the nature and quality of their workers; and employers' use of schools and other educational suppliers. All of the rates reported in the tables that follow are weighted so that they are representative for all U.S. establishments with more than 20 employees in the industries covered by our survey.

Some of what the EQW-NES tells us adds definitive documentation to what many have previously argued or suspected about **Employer Practices**:

- The restructuring of the American economy has not led to a deskilling of work. Quite the contrary, only 5 percent of establishments indicated any reduction in the skill requirements of their jobs, while 56 percent reported increasing their skill requirements (see the "Skill Requirements" table).
- Despite the considerable attention given to new modes of work organization, the use of high-performance work systems among employers still remains the exception rather than the rule. Only one-quarter of establishments reported using any bench-marking programs to compare practices and performances with other organizations, and only 37 percent reported that they had adopted a formal Total Quality Management (TQM) program. Very few workers engage in arrangements that have become the hallmarks of high-performance work: only 12 percent of non-managerial workers participate in self-managed teams, and only

17 percent participate in job rotation. However, on average, 54 percent of non-managerial employees participate in regularly scheduled meetings to discuss work-related problems. Of employers who conduct regular meetings with non-managerial employees, over two-thirds reported that workers discuss working conditions and health and safety issues at these meetings, but only 42 percent of these establishments allow non-managerial workers to discuss choices about new technology or equipment (see the "Work Organization" tables).

- The establishment that makes no training investment in at least some of its workers is a rarity. Virtually *all* establishments provide either formal or informal (on-the-job) training: 97 percent provide informal training, while 81 percent provide formal training. Indeed, over half (57 percent) of the establishments reported an increase in their formal training over the last three years (see the "Training" tables).

Employers' **Assessment of Employees** is more unexpected.

- On the average, establishments reported that just over 80 percent of their workers are fully proficient in their current jobs. The bad news is that one out of every five workers was judged to be not fully proficient, perhaps because he or she lacked the necessary skills or because the skill requirements of the job had increased (see the "Worker Proficiency" table).
- While the mean reported value of the percentage of employees with less than one year of tenure was 21 percent, the median value was slightly less than 10 percent. This finding reflects a modest growth in employment, but the large difference in the mean and median values indicates a marked difference across establishments in the degree of churning in their labor forces (see the "Employee Tenure" table).

In terms of their **Use of Schools**, employer responses represent mixed news.

- There is little evidence that establishments are making significant investments in remedial training or basic education (see the "Training" table in the section on **Employer Practices**).
- Although years of schooling and the skills certificates applicants possess are a factor in employers' screen-

ing and hiring decisions, they pay little attention to measurements of school performance. What is frankly more important to employers is how the applicant presents himself or herself—in terms of attitude and communication skills—and whether or not he or she has a successful history of previous work experience (see the "Recruitment" table in the section on **Assessment of Employees**).

Background: Developing a Different Instrument

Because it was born out of the Center's approach to workforce and education issues, the EQW-NES differs from other national surveys in many ways.

- It focuses on the interaction of establishment practice, organizational structure, and workforce proficiency.
- It documents how employers satisfy their needs for skilled employees—in particular, it catalogues employer attitudes toward schools as likely suppliers of skilled employees.
- It goes beyond the simple measurement of the incidence of training to document other dimensions—the incidence of formal and informal training; training content; training intensity; training expenditures; and the distribution of training by occupational category.

Designed by Professor Lisa Lynch of the Fletcher School of Tufts University—working with EQW's Board of Senior Scholars, EQW Co-Directors Robert Zemsky and Peter Cappelli, and Nevzer Stacey of the School-to-Work Office and the Department of Education—the EQW-NES establishes a baseline for understanding when, how, and why employers invest in the skills of their workers.

Administered by the U.S. Bureau of the Census as a telephone survey in August and September of 1994 to more than 4,000 private establishments, the EQW-NES has a sampling frame that includes employers from both the manufacturing and non-manufacturing sectors. The survey over-sampled establishments in the manufacturing sector and those with more than 100 employees. Public-sector employers, non-profit institutions, establishments with less than 20 employees, and corporate headquarters were excluded from the sample. Computer As-

sisted Telephone Interviewing (CATI) was used to administer each survey, which took approximately 28 minutes to complete. Two versions of the EQW-NES instrument were administered: one for establishments in the manufacturing sector and one for establishments in non-manufacturing. The surveys are virtually identical and differ only linguistically in places where the manufacturing and non-manufacturing sectors use different terms to describe comparable aspects of their businesses.

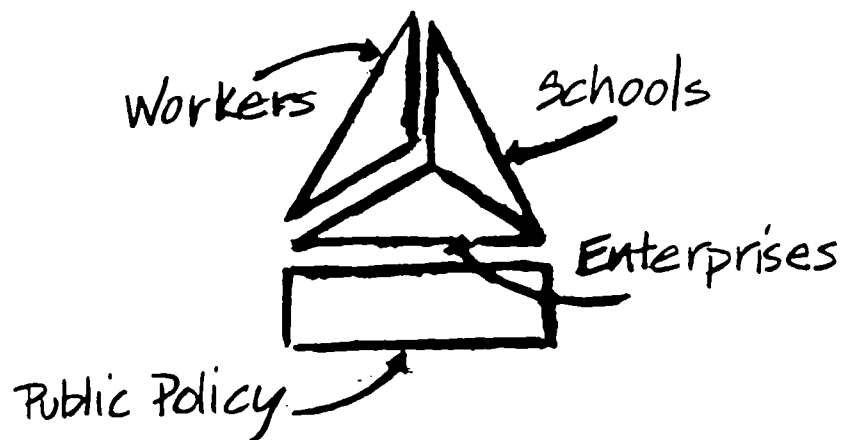
Appendix Table 1 reports final response rates for the survey. Four thousand six hundred twenty-five establishments were contacted and met the requirements of the sampling frame. Of these establishments, 3,347 participated in the survey, which represents a 72 percent response rate (not all contacted establishments completed the survey due to a final cutoff date for all interviews; see the Appendix for more details). However, the majority of the work presented here reflects a subsample of 3,173 establishments (69 percent of all contacted establishments) that provided complete information on employment practices. Appendix Table 2 presents the distribution of the sample by industry, stratified across 21 categories, and Appendix Table 3 presents the distribution of the sample by the number of employees within an establishment along 5 categories of establishment size.

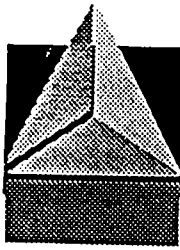
The Survey's Rationale: Investigating the EQW Triangle

The EQW National Employer Survey grows out of the Center's envisioning of the EQW Triangle as the interaction of enterprises, schools, workers, and public policy and the roles these stakeholders have in the development of a skilled workforce. In its publications (*EQW Working Papers*, *EQW Policy Statements*, and *EQW ISSUES*) the Center has observed that responsibility for the quality of the workforce is widely distributed: among managers who must develop the skills of their employees, among schools that need to graduate workers who are well-prepared to function in today's economy, and among students and workers who need to become savvy educational shoppers.

In particular, the Center's research has consistently focused on the responsibility that enterprises have for improving the quality of the workforce. It is the enterprise that assigns employees specific tasks in order to draw a competitive advantage from their abilities and preparedness for work. Yet, it is this area—the work-related strategies and practices of employers—about which policy makers know the least. Much of the debate about the quality of the workforce in general, and the school-to-work transition in particular, focuses on the successes and failures of schools, while giving scant attention either to what employers do or what employers want. The Center has attempted to fill this void by asking the following types of questions on the EQW-NES:

- Have employers really lowered the skill requirements for many of the jobs they offer?
- How much have the organization of work, employers' investments in new technology, and employers' practices actually changed?
- When employers invest in training, what kinds of instruction do they provide and from whom?
- Do employers think that their workers are proficient in their current jobs?
- How important are grades, teachers' recommendations, the reputation of a school, or an applicant's level of schooling in the decision to hire?





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I. Employer Practices

Skill Requirements

Percentage of Establishments That Have Increased, Decreased, or Not Changed Their Skill Requirements

Derived from Question 14: In the last three years, have the skills required to perform production or support jobs (*primary or front-line services or support jobs*) at an acceptable level increased, decreased, or remained the same in your establishment?

Change in Skill Requirements	%
Increased	57%
Decreased	5%
Remained the same	39%

Training

Relative Ranking of Amount of Time Establishments Spend on Various Types of Training

(0=None; 1=Little; 2=Some; 3=Most)

Derived from Question 28: Regarding your non-managerial and non-supervisory employees, how much of their time in formal training is spent performing activities in the following categories:

Type of Training	Rank
Training on the safe use of equipment and tools	1.7
Improving teamwork or problem-solving skills	1.5
Training in sales and customer service	1.5
Training to use computers and other new equipment	1.4
Remedial skills in literacy and arithmetic	0.4

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Training

Percentage of Establishments Offering Formal and Informal Training by Establishment Size

Formal Training Derived from Question 18: Does your establishment pay for or provide any structured or formal training either on-the-job (by supervisors or outside contractors) or at a school or technical institute?

Informal Training Derived from Question 19 (for establishments who do not provide formal training): Unstructured or informal training includes situations in which employees learn by observing others doing a job in an informal one-on-one situation. Does your establishment provide informal (in-plant) instruction by supervisors or co-workers?

or

Derived from Question 32b (for establishments who provide formal training): Unstructured or informal training includes situations in which employees learn by observing others doing the job or are shown how to do a job in an informal one-on-one situation. In addition to your formal training program, does your establishment provide informal (in-plant) instruction by supervisors and co-workers.

Number of Employees	Formal Training	Informal Training
All	81%	97%
20-49	75%	96%
50-99	82%	99%
100-249	90%	98%
250-999	90%	99%
More than 1000	99%	98%



Training

Percentage of Establishments Offering Formal Training

Derived from Question 18: Does your establishment pay for or provide any structured or formal training either on-the-job (by supervisors or outside contractors) or at a school or technical institute?

Percentage of Establishments	81%
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Percentage of Establishments That Have Increased, Decreased, or Maintained Their Level of Formal Training

Derived from Question 29: In the last three years, has the amount of formal training provided to your workers increased, decreased, or remained the same? If there was an increase or decrease, by what percentage?

Formal Training Over Last 3 Years	%
Increased	57%
Decreased	2%
Remained the Same	41%



Work Organization

Mean Percentage of Non-Managerial Workers Regularly Discussing Work-Related Problems

Derived from Question 49: What percentage of non-managerial and non-supervisory workers are involved in regularly scheduled meetings to discuss work-related problems?

Mean across establishments	54%
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Percentage of Establishments Using TQM

Derived from Question 48: Has your establishment adopted a formal Total Quality Management program?

Percentage of establishments	37%
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Percentage of Establishments Participating in Bench-Marking Programs

Derived from Question 47: Has your establishment participated in any bench-marking programs that compare practices and performances with other organizations?

Percentage of establishments	25%
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Work Organization

Percentage of Non-Managerial Employees Involved in Job Rotation

Derived from Question 52: What percentage of non-managerial and non-supervisory employees are currently involved in job rotation?

Mean across establishments	18%
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Percentage of Non-Managerial Employees Involved in Self-Managed Teams

Derived from Question 53: What percentage of non-managerial and non-supervisory employees are currently involved in self-managed teams?

Mean across establishments	13%
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Computer Usage

Percentage of Non-Supervisory Workers Who Use Computers

Derived from Question 12: What percentage of your production and non-supervisory employees use computers in their jobs?

Mean across establishments	42%
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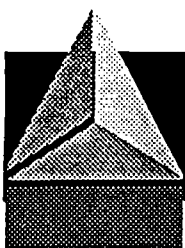
Investment in Equipment

Age of Machinery and Equipment

Derived from Question 10: Approximately what percentage of your machinery or equipment used in production is:

Age of Equipment	Mean %
Less than 1-year-old	12%
Between 1- and 4-years-old	37%
Between 5- and 10-years-old	36%
More than 10-years-old	14%





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II. Assessment of Employees

Worker Proficiency

Percentage of Employees Proficient at Their Jobs

Question 37: What percentage of your workers would you regard as being fully proficient at their current jobs?

Mean across establishments	80%
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Percentage of Proficient Employees	% of Establishments
Less than or equal to 75 percent	32%
Greater than 75 and less than or equal to 85 percent	21%
Greater than 85 and less than or equal to 95 percent	27%
Greater than 95 percent	19%

Recruitment

Relative Ranking of Factors in Making Hiring Decisions

(1=Not Important or Considered; 5=Very Important)

Derived from Question 57: When you consider hiring a new non-supervisory or production worker (*front-line worker*), how important are the following in your decision to hire?

Applicant Characteristics	Rank
Applicant's attitude	4.6
Applicant's communication skills	4.2
Previous work experience	4.0
Recommendations from current employees	3.4
Previous employer recommendation	3.4
Industry-based credentials (certifying applicant's skills)	3.2
Years of completed schooling	2.9
Score on tests administered as part of the interview	2.5
Academic performance (grades)	2.5
Experience or reputation of applicant's school	2.4
Teacher recommendations	2.1



Employee Tenure

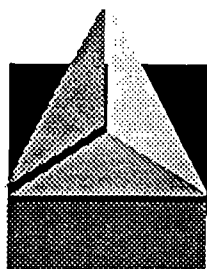
Percentage of Employees with Less Than One Year of Tenure

Question 44: What percentage of your currently employed workers have been with the firm for less than one year?

Percentage of Employees with ≤ 1 Year of Tenure	% of Estab- lishments
0 percent	10%
Greater than 0 and less than or equal to 5 percent	19%
Greater than 5 and less than or equal to 10 percent	20%
Greater than 10 and less than or equal to 20 percent	17%
Greater than 20 percent	34%

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III. Use of Schools

Use of Schools as Training Sources

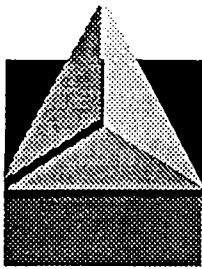
Percentage of Establishments Using Various Training Sources

Derived from Question 31: Does your establishment use any of the following outside sources of trainers?

Sources of Training	%
Equipment suppliers or buyers	50%
Private consultants	36%
Private industry councils or other industry associations	34%
Technical and vocational institutions	33%
Community and junior colleges	30%
Four-year colleges or universities	20%
Government-funded training programs	12%
Unions	5%

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IV. Appendix

- **Response Rate Table**
- **Distribution of Sample by Industry**
- **Distribution of Sample by
Establishment Size**

Table 1

EQW National Employer Survey Response Rates¹

Manufacturing Sector	Percentage	Number of Cases
Completed + All Partials ²	75.0%	1,831
Completed + Workplace Partials	70.4%	1,728
Completed Interviews	66.0%	1,621

Non-Manufacturing Sector

Completed + All Partials	69.4%	1,516
Completed + Workplace Partials	66.2%	1,445
Completed Interviews	60.6%	1,324

¹ Empirical analysis of the determinants of the probability of refusing to participate in the survey showed no significant impact of establishment size or industry on the probability of responding for the non-manufacturing sector. For manufacturing, establishments in the largest size category (1000 employees or more) were slightly more likely to refuse to participate in the survey than establishments in all other size categories.

² Since all interviews had to be completed by the end of September 1994, some of the surveys were not completed. The survey allowed for multiple respondents and was divided into two main sections: establishments' sales and financial information, and employment practices. The bulk of the survey's questions were contained in the employment practices section of the survey. Therefore, the final sample includes some partial interviews. Our analysis focuses on both the completed and the workplace partial interviews.



Table 2

Distribution of Sample by Industry

	Unweighted Percentage	Weighted Percentage
Manufacturing		
Food and Tobacco (SIC 20, 21)	5%	2%
Textile and Apparel (SIC 22, 23)	4%	2%
Lumber and Paper (SIC 24, 26)	6%	2%
Printing and Publishing (SIC 27)	5%	2%
Chemicals and Petroleum (SIC 28, 29)	6%	1%
Primary Metals (SIC 33)	6%	2%
Fabricated Metals (SIC 34)	5%	2%
Machinery & Computers, Electrical Machinery, and Instruments (SIC 35, 36, 38)	6%	4%
Transportation Equipment (SIC 37)	6%	1%
Miscellaneous Manufacturing (SIC 25, 30, 31, 32, 39)	6%	2%
Non-Manufacturing		
Construction (SIC 15-17)	5%	7%
Transportation Services (SIC 42, 45)	4%	3%
Communication (SIC 48)	2%	2%
Utilities (SIC 49)	4%	1%
Wholesale Trade (SIC 50, 51)	5%	11%
Retail Trade (SIC 52-59)	4%	34%
Finance (SIC 60-62)	4%	4%
Insurance (SIC 63, 64)	4%	2%
Hotels (SIC 70)	5%	2%
Business Services (SIC 73)	4%	7%
Health Services (SIC 80)	4%	8%

Total unweighted observations = 3,173



Table 3

Distribution of Sample by Establishment Size

Number of Employees at Establishment	Unweighted Percentage	Weighted Percentage
20-49 Employees	17%	53%
50-99 Employees	15%	23%
100-249 Employees	19%	14%
250-999 Employees	29%	8%
1000 or more Employees	20%	2%

Total unweighted observations = 3,173

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The National Center on the Educational Quality of the Workforce

The EQW Mission

EQW is a partnership between one of this nation's premier business schools and one of its leading graduate schools of education. Established by the University of Pennsylvania's Wharton School and Graduate School of Education under a cooperative agreement with the U.S. Department of Education, EQW's program of research and policy analysis focuses on the renewal of American competitiveness through leveraged investments in the quality of the nation's workforce.

The EQW research agenda focuses on four broad questions, which refine our research agenda and provide a basis for communications activities driven by findings and policy analysis:

1. To make their enterprises more effective, what do employers need to know to better use the education (knowledge and skills) workers bring with them and acquire in the workplace?
2. How could schools become more effective suppliers of skilled and disciplined workers?
3. How can workers continue to add to their portfolio of skills and knowledge on which a productive economy depends?
4. What is the best role for public policy in the development of a market for work-related education that efficiently links consuming firms, supplying schools, and educated workers?

EQW's primary activity is to assimilate research by leading scholars and practitioners to produce a series of timely publications, reports, conferences, and public policy seminars designed to enrich the national dialogue on workforce issues. This dialogue, emphasizing the linkages among businesses, workers, and educational suppliers, speaks to the need to make American firms more adaptive and competitive, make American workers more aware of essential skills and the opportunities for acquiring them, and make American schools at every level more successful in meeting the learning needs of both employers and individual members of the workforce. Two governing boards—the Board of Senior Scholars, which consists of faculty members responsible for the Center's research, and the National Advisory Board, whose membership reflects a cross-section of the leadership of American enterprises to which our agenda is addressed—shape EQW research activities and advise the development of its dissemination programs.

The EQW Research Agenda

EQW scholarly research is organized around individual projects that relate in different ways to the four broad questions guiding our agenda. In its first four years, the Center has developed research projects that focus on a varying range of workforce issues: the capacities of firms to manage a skilled workforce, the attitudes about work and skills that employees bring with them to the workplace, the ways in which formal education affects employees' work lives, and the abilities of schools and other parties to be effective suppliers in an expanding market for work-related education. The following projects represent research currently being conducted during the fifth year of the Center's operation.

Basic Enumerations and Data Collections. The objective of this project, a five-year effort, is to develop, test, and make available to the research and practice communities integrated data sets for benchmarking the scale, scope, and content of the work-related education and training of adult learners.

Ethnographic Study of the Skills Requirements in Technical Occupations. This project is a multi-year study focusing on the "new crafts" to determine the specific knowledge and skills—physical, verbal, mathematical, and interpersonal—required of workers in order to perform effectively in highly technical occupations.

Changes in Firm Behavior: Understanding Variances in Training Investments, Employment Practices, and Human Resource Functions. This project is a quantitative investigation using field studies and data analysis to determine why some firms choose to invest in education and training while others do not.

Using Work Readiness as a Measure of School Effectiveness. This project is a pilot study to test the efficacy of a large-scale empirical investigation of the relationship between school inputs and labor market outcomes.

Comparative Study of the Interaction of Local Education and Labor Markets. The purpose of this project is to develop a framework for understanding the local context in which to fit the Center's findings on how best to improve the educational quality of the workforce.

The EQW Dissemination Program

From its inception, the EQW dissemination program was structured to foster the Center's role as convener, opening channels of communication among our constituencies—enterprises, schools, workers, and those responsible for public policy—through the presentation of our research. Over the past three years, our family of publications and Washington Public Policy Seminars have served as the primary vehicles through which we reach those constituencies.

Family of Publications. Our family of publications include *EQW ISSUES*, *EQW Policy Statements*, *EQW Working Papers*, and *EQW Databooks*. *EQW ISSUES* are briefing papers that present the translation of academic research on workforce issues into layman's terms. *EQW Policy Statements*, authored by the EQW National Advisory Board, synthesize the Center's research findings and offer policy recommendations based on those findings. *EQW Working Papers* and *Databooks* represent the formal publication of EQW-sponsored research.

Washington Public Policy Seminars. The Washington Public Policy Seminars, in particular, have proved to be a successful venue for the presentation of EQW research. Initiated during the Center's first year, this series regularly attracts legislative- and executive-branch staff members concerned with workforce issues. During these seminars, EQW scholars or affiliated practitioners present research findings to a Washington policy audience, who help to shape national dialogues on workforce issues. Held at the Department of Education's Office of Educational Research and Improvement, recent seminars have included:

"The Changing World of Universities: Marketplaces and Labor Markets" by Robert Zemsky, Professor and Director at the Institute for Research on Higher Education at the University of Pennsylvania and EQW Co-Director.

"Who Will Take the Military's Place as a Major Supplier of Both Skills and Compartment?" a panel discussion with Dr. Stephen Barley, Professor of Organizational Behavior at Cornell University's School of Industrial and Labor Relations, and Dr. Janice Laurence, Senior Staff Scientist at the Human Resource Research Organization.

"British Lessons for School-to-Employment Transition Policy in the United States" by Peter Cappelli, EQW Co-Director, and Paul Ryan, Fellow of Kings College at Cambridge University.

"What Works with Training" by Dr. Wayne Cascio, Professor of Management at the University of Colorado at Denver.

"School-to-Work Transition: Lessons on Recruiting and Sustaining Employer Involvement" by Joan Wills of the Center for Workforce Development at the Institute for Educational Leadership and Irene Lynn of the Employment and Training Administration at the U.S. Department of Labor.

"Schools and Labor Market Outcomes" by David Crawford, President and CEO of Econsult Corporation and Adjunct Professor of Economics and Management at the University of Pennsylvania, Amy Johnson, EQW Project Manager, and Anita Summers, Professor Emeritus at the Wharton School of the University of Pennsylvania.

"Behavioral Skills in the Workplace: What Do Youth Need to Succeed?" by Peter Cappelli, EQW Co-Director.

"Is There Churning in the Labor Market? Job Stability and Youth in the United States" by David Neumark, Professor of Economics at Michigan State University.

If you would like to inquire about the Center or to request its free publications catalog, please call the Education Line, 1-800-437-9799, or e-mail the Center at "eqw-requests@irhe.upenn.edu".

1/19/95

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P-5

Federal School Spending Won't Push Economy

Federal investment in public education is not likely to contribute to dramatic economic growth, says a liberal economic think tank.

The result of additional federal education investments, such as tax deductions or tax credits for postsecondary education, would only increase growth about 0.1 percent per year, not enough to speed economic growth over the next decade, the Brookings Institution says.

"Increases in either public [education] investment through an expansion in government programs, or private investment through tax cuts, would have to be paid for mainly by reductions in other areas of government spending," Brookings says in its 19th guidebook to federal budget options released yesterday in Washington, D.C.

The benefits of spending more federal money to reduce student-teacher ratios, raise teachers' salaries or provide more computers for schools are harder to determine, Brookings says.

Conventional wisdom held that it was difficult to document any economic gains from widespread increases in per-pupil spending, even though individual success stories abound. However, recent state-by-state comparisons are challenging that notion, showing states that increase their investments see a benefit.

"Setting National Priorities: Budget Choices for the Next Century" is \$42.95, plus \$3.50 for shipping, from Brookings Institution, 1775 Massachusetts Ave. NW, Washington, D.C. 20036, (202)797-6258 or (800)275-17447.
—Regina Lightfoot-Clark

December 18, 1996 • Education Daily

P-5

Presidential Panel Links Economy To Education

Weaving environmental, economic and social justice issues into school curricula from the earliest grades will raise the nation to a new level of prosperity, a blue-ribbon panel says.

Lifelong learning that fosters cooperation among schools, businesses and communities will yield development that meets today's needs without compromising the needs of future generations, says a report released earlier this month by the President's Council on Sustainable Development.

Education policymakers should require knowledge of education for the nation's "sustainability" as part of teacher licensing and certification, provide teacher training, and create content standards that eventually would yield curricula on such matters, the report says.

For example, teachers can obtain knowledge and lessons plans on environmental education through programs like the North American Association for Environmental Education's Project Learning Tree, sponsored by the Environmental Protection Agency.

"Education for Sustainability: An Agenda for Action" is free from President's Council On Sustainable Development, 730 Jackson Place NW, Washington, D.C. 20503, (202)408-5296.
—Regina Lightfoot-Clark

The New York Times
May 5, 1996

For more information
contact the American
Federation of Teachers
Public Affairs Dept.,
202/879-4458.

Where We Stand

By Albert Shanker, President
American Federation of Teachers

Education and Productivity

Last year, a national survey of 3,000 businesses reported that companies hiring young graduates pay very little attention to their high school achievement. This was not exactly news. It simply made explicit the weak link in the U.S. between school and work that some people have been worried about for a long time. But when researchers did further analyses of the survey data, they found something else. Whether or not businesses ignore it, there is a solid connection between a company's productivity and the education of its workers.

The National Employer Survey, as it is called, was carried out by the U.S. Census Bureau for the U.S. Department of Education in 1994. The survey found that businesses rank measures of formal education—years of schooling, test scores, the reputation of the school an applicant attended, and the applicant's grades—below non-school measures. And though they consider recommendations from current and past employers important, teacher recommendations are at the bottom of the list.

If asked to explain why they have little interest in school performance, the businesses would undoubtedly have said that high school graduates are often so poorly prepared that it is not worth the time and expense to see whether John got better grades or took tougher courses than Bill. The trouble is, as I wrote in an earlier column about this survey ("Linking School and Work," April 23, 1995), this is a "self-fulfilling prophecy." If a lot of people start withdrawing money from a bank because they are afraid it will fail, the bank will certainly fail. When businesses regularly disregard what students have accomplished in school, most students will see no reason to take tough courses instead of easy ones. In fact, they'll feel stupid if they do. As a result, educational achievement will continue to slide.

However, a second round of findings based on data from the National Employer Survey links hiring more-educated workers with increased productivity. In "The Other Shoe: Education's Contribution to the Productivity of Establishments," researchers from the National Center on the Educational Quality of the Workforce looked first at the effect on productivity associated with an increase in the book value of a company's capital stock. They found that a 10 percent increase in capital stock was associated with a 3.4 percent increase in productivity. If hours worked were increased by 10 percent, there was a 5.6 percent increase in productivity. But a 10 percent increase in employees' average education (which is equal to a little more than one additional year of schooling) was associated with an 8.6 percent increase in productivity. This was true for all the businesses surveyed. When researchers looked at productivity increases in the nonmanufacturing sector, they found an even greater effect: A 10 percent increase in education was associated with a hefty 11 percent increase in productivity. The same survey that established the unimportance of education in hiring decisions also makes clear that businesses that ignore education are missing the boat.

Additional analyses of data from the National Employer Survey also indicate that considering applicants' education makes a difference in employee turnover and thus in recruitment costs. According to "Weighing the Benefits: Incentives for Connecting Schools and Employers" (Change magazine, March/April 1996), many employers say they don't bother screening applicants. Instead they "try them out," a technique that results in "a series of hires and fires until both employer and employee [find] a suitable match." In contrast, companies that use school measures as "important criteria" in screening candidates have a much lower turnover rate. During the first year, there is a 10 percent difference between employers who consider education important and those who do not. Undoubtedly this means that companies that pay attention to school measures save money on recruitment and on training new employees.

Should we be surprised that hiring workers who are more educated leads to greater productivity or job stability? I don't think so. Still, it is difficult to turn around a settled practice, like ignoring school achievement, and if it takes quantitative research to establish the obvious, so be it. (We are certainly used to that in education.) Furthermore, the results of this survey will make it easier for business leaders to carry out the pledge they made at the Education Summit in March—that is, to pressure companies to begin calling for school transcripts when they are hiring recent graduates. And when that happens, we'll know we are on our way to establishing a connection between school and work.

For more information on the National Employer Survey or to obtain a copy of "The Other Shoe," call 800-371-4799.



As the survey makes clear, businesses that ignore education in their hiring decisions are missing the boat.

Mr. Shanker's comments appear in the Education section of the New York Times. He is the president of the American Federation of Teachers, the largest teachers' union in the United States. He is also a member of the National Education Policy Board, a group of leading educators and business leaders who are working to improve the quality of education in the United States.

WHERE DO WE STAND IN EDUCATION?

Background Notes for the First Lady for
Summit of the Americas Spouses' Meeting
December 10, 1994¹

The following statistics paint a mixed picture of education in the United States--some real strengths, some clear signs of improvement, and areas in which a great deal of work lies ahead.

Access to Schooling

- o **School enrollment in the United States is virtually universal.** All states mandate compulsory schooling through the age of 16. Enrollment rates among children 6 to 15 years of age are essentially 100 percent.
- o **Preschool enrollment.** Enrollment rates among children 3, 4, and 5 years old have increased substantially since 1970. Virtually all children now attend kindergarten. And over half of our 4-year-olds are now attending preschool (up from 29 percent in 1970).
- o **Postsecondary enrollment.** The percentage of high school graduates who enrolled in college following graduation increased from 49 percent in 1980 to 62 percent in 1992. Almost no other country has postsecondary enrollment rates comparable to this one.

Dropout Rates

- o **Overall, high school dropout rates have gradually decreased in the United States.** For example, only 6 percent of students who were sophomores in 1990 left school without completing high school or its equivalent two years later.
- o **However, dropout rates for younger students are troubling.** For example, of the members of the 8th grade class of 1988, nearly 7 percent had dropped out of school by spring of their sophomore year.
 - Over half of the students left because they "did not like school," while about 40 percent left because they were failing school.
 - Almost one-third of females who dropped out between 8th and 10th grade reported that they left school because they were pregnant.

¹ Major portions of these notes are derived from *The Condition of Education 1994*, a U.S. Department of Education/National Center for Education Statistics publication.

Student Achievement

In international comparisons of student achievement, the evidence is also mixed.

- o U.S. students fare poorly compared to students in other developed countries on international assessments of mathematics and science--areas particularly critical to the high-tech areas of our economy.
 - For example, in 1990-91, U.S. 13-year olds ranked ahead of only one of the 14 other countries whose students took the mathematics portion of the International Assessment of Educational Progress (IAEP). (Test scores of U.S. students and those of two countries were approximately equal.)
 - In science, U.S. 13-year olds ranked ahead of only two of the other countries.
- o On the other hand, in the 1992 International Study of Reading Literacy, U.S. nine-year olds were second out of 28 participating nations; U.S. 13-year olds were ninth. These results may reflect the considerable emphasis placed on reading and language arts in our primary schools.

When comparing domestic (U.S.) achievement results over time:

- o proficiency in both mathematics and science on the National Assessment of Educational Progress (NAEP) increased between 1982 and 1992 for all three age groups sampled.
- o Reading scores have been virtually unchanged over the decade.

Differences among Racial/Ethnic Groups

The averages cited above mask numerous important differences. Students from most minority groups lag behind white students in completion rates and achievement.

- o **The gap between dropout rates for blacks and whites is still too high, although it has narrowed.**
 - While 9 percent of white students enrolled in 8th grade in 1988 neither had completed high school nor were still enrolled in school in 1992, 14 percent of blacks, 18 percent of Hispanics, and 25 percent of American Indian students had dropped out.
- o **The gap between achievement of black and white students persists.** It narrowed in the 1970's and early 1980's, but has not narrowed further.

- Since the early 1970's, proficiency scores for blacks have drawn closer to those for whites in reading, mathematics, and science. Still, average scores are considerably below those of white students.
- o **Minority children are at an educational disadvantage relative to whites because of several factors**, including: lower average levels of parental education, a greater likelihood of living with only one parent, different community characteristics deriving from relatively segregated living patterns, and the fact that black children are much more likely to experience poverty than white children.
- In 1992, 46 percent of black children under 18 and 39 percent of Hispanic children were poor, while 16 percent of white children lived in families with an income level below the poverty line.

ED/PES 12/2/94

EXECUTIVE
SUMMARY
OF THE
INTERIM REPORT
TO
CONGRESS

WASHINGTON, D.C.

Secretary's Commission on Achieving Necessary Skills (SCANS), such as teamwork and understanding organizational systems, but less likely to emphasize the academic components of the SCANS "foundation skills." Yet a study of SCANS skills in the utilities industry finds that the foundation skills are significantly related to job performance, while most of the workplace competencies are not.

Vocational classes in secondary school tend not to have pre-requisites, a characteristic that maximizes access to them but reduces the chances of aligning vocational courses with relevant academic courses. Approximately one-third of the regular school districts have no completion requirements for vocational programs. One-half require a concentration of vocational courses in a particular occupational area for program completion. Research indicates that such concentration increases the earnings of those who find work related to their training and increases the chances of finding training-related work.

Outcomes of Vocational Education

3. Employment Outcomes. The Perkins Act calls for assessment of the academic and employment outcomes of vocational education.¹¹ Research on academic outcomes is still in process, and the results will be included in the Final Report. Here we concentrate on employment outcomes, which in many ways are the yardstick in evaluating vocational programs. If there is a positive relation between vocational coursetaking and employment status, level of occupation, and/or earnings, taking other factors into account, then the student's participation in vocational education, and the public's investment in it, will have been worthwhile. What evidence is there that vocational education pays off? (See Chapter 15.)

Economic returns to vocational educational education at the secondary and postsecondary levels are conditional on a number of factors. The following are associated with better employment and earnings outcomes:

Finding a job that matches a field of study. Vocational students who do so tend to earn more money and have a lower incidence of unemployment over time than those who do not. Less than 40 percent of secondary graduates are able to find jobs that match their training. Postsecondary students do better, on average: Almost two-thirds of them find training-related employment.

Concentration of coursework in a particular field of study. Students who concentrate their coursework in a vocational field earn more in training-related jobs, are more likely to find training-related jobs, and are less likely to be unemployed than those who do not.

Completion of a degree or certificate. Postsecondary vocational students who earn degrees or certificates do better than similar individuals with no postsecondary certification. There is also recent evidence that taking some postsecondary vocational courses yields better labor market outcomes than high school graduation alone.

Field of study. At the secondary level, those with training in business and health-related fields, mostly women, earn higher wages and experience less unemployment than those in other fields. At the postsecondary level, associate's degrees in health and technical fields tend to improve earnings.

Type of postsecondary institution. Community college students are more likely to be employed and to use their vocational training on the job than trainees from other types of postsecondary institutions.

Gender of the student. Economic outcomes for women with vocational training surpass those for men. Women are more likely than men to improve their wages and earnings with vocational training, more likely to find a match between training and employment, and more likely to benefit from completing a degree.

Vocational education for disabled students. Secondary students with disabilities who take vocational education are more likely to be employed than those who do not. Participating in work experience programs increases their likelihood of finding a job, and taking a coherent sequence of vocational courses increases their earnings. Disabled students with vocational training also tend to have better grades and attendance records than others and are slightly less likely to drop out of school.

Reducing dropout rates is often a goal of secondary vocational education. However, studies relating vocational coursetaking to dropout rates show mixed results, other than for disabled students. Most indicate no relation or a negative relation.

Because academics are assumed to be an important part of workforce preparation, a review of the literature relating academic skills to employment outcomes is being conducted. One study examined so far shows that the value of basic math skills is increasing as the labor market changes. This development may reflect a greater emphasis in the market on conceptual skills. In addition, the returns to basic math skills increase as individuals move further along in their careers. Mastery of these skills has a much greater impact on wages six years after graduation than two years after graduation.

Income Gains and Losses Tied to Education and Gender



U.S. Department of Labor
Bureau of Labor Statistics
July 1994

Summary 94-5

Median real income of all year-round full-time workers age 25 and over has not changed significantly since the late 1970s. The median for all workers, however, masks different changes in medians among sex and level-of-education groups. Women college graduates have had large income gains, and men without college have had large losses. As a result, the income gap between the college educated and those without a college education has widened, while the income gap between men and women has narrowed.¹

Because income levels fluctuate over time and are influenced by business cycles, results of trend analysis depend to some extent on the beginning and end year selected. Both 1980 and 1990 were recession years and by 1992, incomes for all men and for all women were still below their 1989 peak. Therefore, this analysis focuses on the 10-year peak-to-peak period, 1979 to 1989. Chart 1 and the table, also show trends to 1992, the latest year for which data are available.

Income gaps—men and women, college and without college

In 1989, the income of all year-round full-time workers age 25 and over was 2 percent below the 1979 level. However, income of women with at least 4 years of college was 16 percent higher, and income of men with 4 years of high school or less was 14 percent lower. As a result of these income changes, the gap between men's and women's income narrowed. Men's median income was 69 percent higher than women's in 1979; by 1989, it was 48 percent higher. For those with 4 years or less of high school, the gap narrowed as men's incomes dropped sharply while women's held steady. For those with 4 or more years of college, the gap narrowed as women's incomes grew rapidly and men's, slowly. Nonetheless, disparities in 1989 were still large. For example, women with 4 years of college earned barely more than men with 4 years of high school.

However, the gap between college-educated and noncollege-educated workers widened. Workers with 4 years of college earned 24 percent more than those with 4 years of high school

in 1979; by 1989, they earned 50 percent more. Combining data for women and men obscures much of the change.

For women, the gap widened because income of the college-educated grew rapidly, while income of those without college changed little. For men, the gap widened as income for those with 4 or more years of college grew slowly, while income of those with high school or less dropped sharply.

Effects of recessions and recoveries

Real income of every group except women with 4 years of college dipped during the recession years of 1980 through 1982. However, women with at least some college quickly recovered and surpassed their 1979 levels. Real income of men with 4 years of high school or less recovered only slightly from their lows and never rebounded to their 1979 levels. Incomes of all groups of men except those with 5 or more years of college and women with 4 years of high school started to decline again after 1986 or 1987,² several years before the 1990 recession. From 1989 to 1990, the income of every group declined.

Post 1990 trends

Income trends by level of education from 1990 to 1991 are more difficult to assess. Prior to 1991, data show income by years of school completed; afterward, by highest award attained. For example, it shows 4 years of college before 1991 and a bachelor's degree afterwards. (See key in chart 1 for list of other corresponding levels of education.) Thus the change in income by level of education, between 1990 and 1991 cannot be measured precisely, although the income for all women and for all men declined slightly. The differences in reported incomes for corresponding levels of education are not very large, except between those with 5 or more years of college and those with advanced degrees, which normally require at least 6 years of college to complete. From 1991 to 1992, real incomes of men in all categories declined, while incomes for women held even or increased slightly.

Information in this report is available to sensory impaired individuals upon request. Voice phone: (202) 606-7828; TDD phone: (202) 606-5897; TDD message referral phone: 1-800-326-2577. For additional information contained in this report, call (202) 606-5713.

¹ This analysis is based on March Current Population Survey data and refers to annual income for year-round full-time workers 25 years and over. This group was selected to minimize the effects of changes over time in the number of hours worked and in the proportion of entry-level workers, who usually have low wages. Income consists primarily of wage and salary income and net income from self employment, but also includes interest, dividend, and rent income, plus pensions, unemployment compensation, and so on.

² Income of men with 4 years of college peaked in 1986, never fully recovering from the decline after 1972.

Median real income of workers by education level and gender, 1972 and 1979-92

Year	Women, 25 years and older					
	Total, all levels	Less than 4 high school	4 years high school	1-3 years college	4 years college	5 + years college
1972	20,000	15,571	19,478	22,178	27,597	34,863
1979	20,982	15,535	19,824	22,468	25,473	31,637
1980	20,709	15,556	19,855	22,035	25,798	30,898
1981	20,835	15,016	19,183	22,322	25,402	31,357
1982	21,234	14,852	19,419	22,872	25,528	31,533
1983	21,531	15,039	19,412	23,283	25,981	32,211
1984	21,817	15,332	19,658	22,948	27,333	33,835
1985	22,312	14,878	20,171	23,439	27,889	33,783
1986	22,580	14,994	20,400	23,687	28,671	34,897
1987	22,981	15,170	20,421	24,612	28,673	37,092
1988	23,114	14,844	19,929	24,712	29,880	35,727
1989	23,282	15,086	19,819	24,453	30,218	36,252
1990	22,947	14,768	19,665	23,855	30,096	36,245
1991	22,704	14,183	19,401	23,719	29,951	38,184
1992	23,201	14,126	19,482	23,975	30,394	38,115

Year	Men, 25 years and older					
	Total, all levels	Less than 4 high school	4 years high school	1-3 years college	4 years college	5 + years college
1972	35,217	27,258	34,980	39,260	47,003	53,315
1979	35,461	29,355	34,303	39,704	42,484	49,010
1980	34,578	26,111	33,168	36,821	41,417	47,173
1981	33,755	24,982	32,057	35,119	41,078	47,365
1982	33,525	23,517	31,808	34,683	41,112	47,412
1983	33,639	23,327	30,727	34,855	42,088	48,778
1984	34,403	23,807	31,387	34,854	42,485	49,703
1985	34,352	23,337	31,079	35,128	42,785	51,278
1986	34,871	23,700	31,599	35,851	43,995	50,648
1987	34,837	23,821	31,453	36,796	43,838	51,792
1988	34,773	22,867	30,877	35,719	43,184	52,091
1989	34,358	22,153	29,926	35,184	43,554	52,972
1990	32,995	20,916	28,457	33,879	41,987	52,690
1991	32,561	20,604	27,662	33,201	42,133	58,138
1992	32,157	19,936	27,357	32,554	41,406	57,686

Source: Bureau of the Census, Current Population Survey

Note: Year-round full-time workers. Annual income in 1992 dollars.

Definitions of level of education changed after 1990.

New definitions are:

Less than 4 years high school
= Not a high school graduate

4 years high school
= High school graduate

1-3 years college
= Associate degree or some college but no degree

4 years college
= Bachelor's degree

5+ years college
= Post bachelor's degree

Chart 1. Median real income of workers by education level and gender, 1979-92

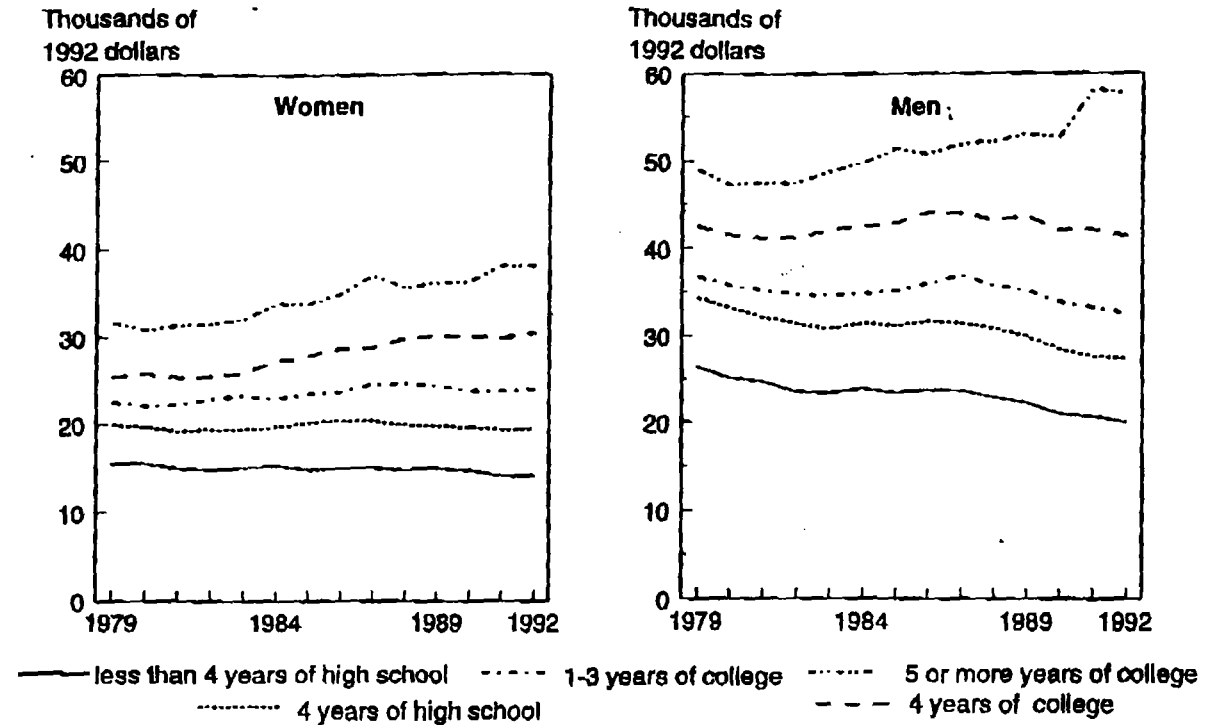
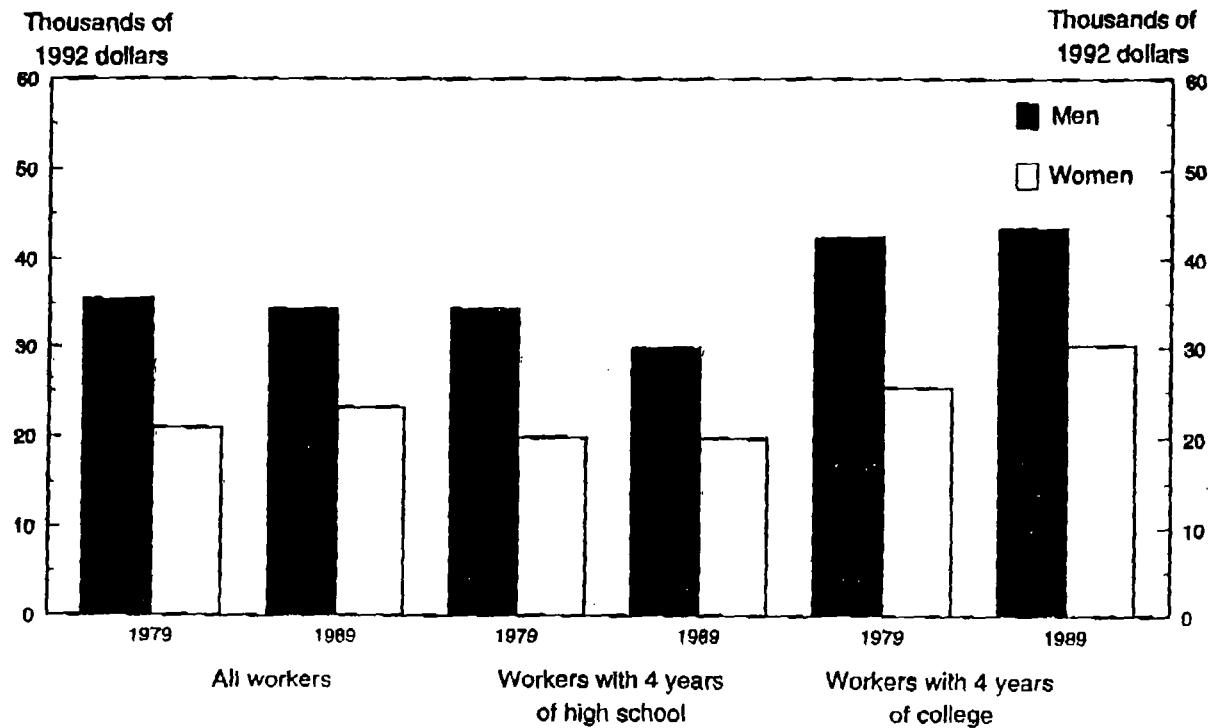
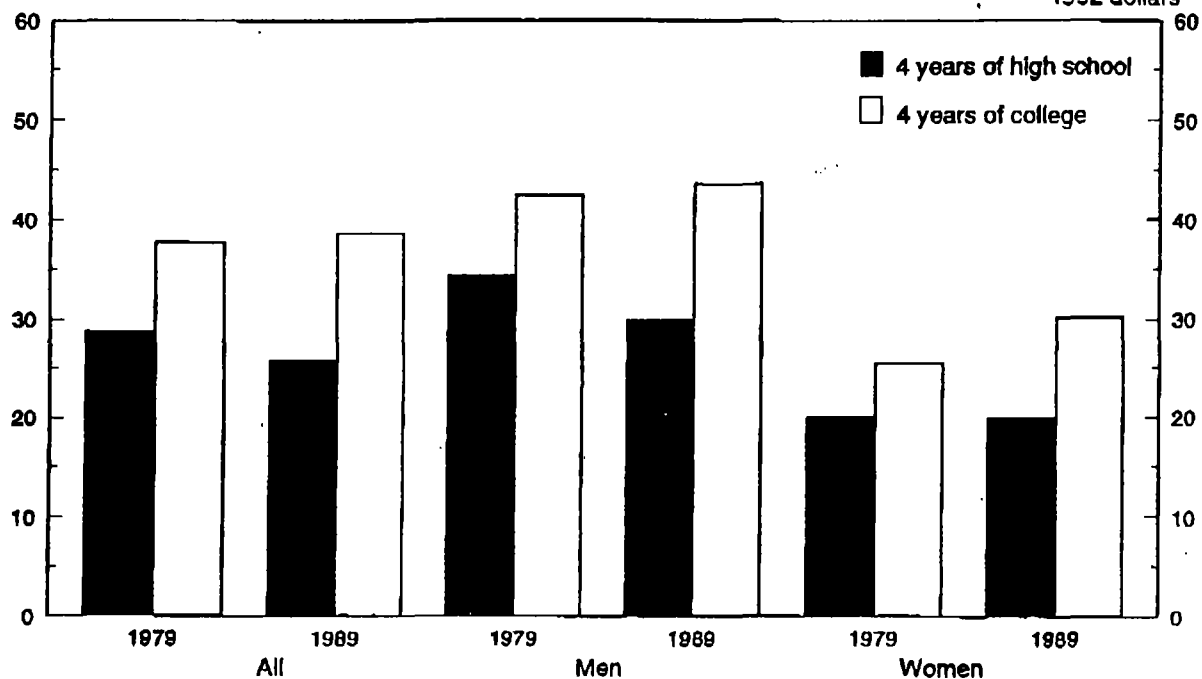


Chart 2. Median income by sex, 1979 and 1989



SOURCE: Bureau of the Census, Current Population Survey

Chart 3. Median Income of college and noncollege graduates, 1979 and 1989Thousands of
1992 dollarsThousands of
1992 dollars

SOURCE: Bureau of the Census, Current Population Survey

Investing in People:
Public Policies to Develop Human Capital

Remarks by Marshall S. Smith
United States Under Secretary of Education

"...we all know...we can do all these things, put our economic house in order, expand world trade, target the jobs of the future, guarantee equal opportunity, but if we're honest, we'll all admit that this strategy still cannot work unless we also give our people the education, training and skills they need to seize the opportunities of tomorrow."

-- President Clinton

The importance of human capital

At the heart of the Clinton Administration's domestic agenda is a belief in investing in people, to develop their knowledge and skills--their human capital--both for their own benefit and that of society.

Increasingly in the United States and many of our societies, human capital is what differentiates the "haves" from the "have-nots"--those who are highly paid from those who receive the minimum wage, those with health insurance and retirement plans from those without adequate protection, those with a bright future from those whose prospects are bleak.

Developing the human capital of all of our people is our best hope for the economic security of our nations, and, I will argue, for the continued strength of our democracies, as well.

The economic reasons for developing human capital

In today's world, what you know is the key to what you earn.

- In 1990, in the United States, average monthly earnings for those with a bachelor's degree were *twice* those of people with only a high school diploma, and *four* times higher than those who had not graduated from high school. (Kominski and Sutterlin, 1992). Put another way, a student who graduates from high school can expect to earn \$200,000 more over his or her lifetime than one who did not; for a student who receives a bachelor's degree, the difference is almost \$1 million. (U.S. Bureau of the Census 1994, as cited in U.S. Department of Education, **Strong Families, Strong Schools**, 1994).
- Conversely, persons at a low level of literacy are 10 times more likely to be in poverty than persons with high literacy levels (National Adult Literacy Survey, 1993).

As U.S. Labor Secretary Robert Reich recently observed:

"The fundamental fault line running through today's workforce is based on education and skills. Well-educated and skilled workers are prospering; those whose skills are out of date or out of synch with industrial change anxiously contemplate their prospects; those without education or skills drift further and further away from the economic mainstream."

In all of the developed economies, from Australia to Germany, and from Japan to the United States, jobs in high-skill sectors have grown rapidly, while job growth in low-skill sectors has been slow (OECD 1994 and Reich 1994). Even in the more traditional sectors--agriculture, extractive industries, ~~manufacturing~~--most new jobs--and certainly the best jobs--now require considerable knowledge and skill. These jobs call for facility in using computers, reading technical manuals, performing numerical calculations, understanding safety procedures, solving problems, and communicating with others.

Today and increasingly in the future, high-paying jobs will require both *more* knowledge and skills, and different *kinds* of knowledge and skills--analytical skills, problem-solving skills, computer skills, and people skills. And because of the explosion of information, processes (and hence, specific skills) change rapidly, so the need to learn does not end at age 16 or 21. The great majority of the new jobs require what Peter Drucker calls "a habit of continuous learning" (Drucker 1994, p.62). But these are the very skills and habits that a sizable part of our population does not have.¹

As a result, we have growing inequality--between those who are comfortable and growing more so, and those who are losing ground. In the United States, by any measure we choose, income inequality has grown.

- In just one decade (the 80's), the gap between what a male college graduate earned and what his high-school graduate counterpart received widened by more than half. And it's not just a case of those with better skills getting ahead faster. From the early 70's to the early 90's, while incomes for the upper 20 percent of families *rose* a healthy 19 percent in real terms, among the bottom 20 percent of families, incomes *fell* by 12 percent (National Economic Council 1993).
- The number of poor persons has grown, and more than 20 percent of our children live in households with incomes below the poverty line. Sadly, in 1992, more than a million people with children under 18 worked full-time,

¹ In the recent National Survey of Adult Literacy, some 40 million adults--more than one-fifth of our population--performed in the very lowest level of prose, document, and quantitative proficiencies.

year round and still were in poverty (U.S. Bureau of the Census 1993). For these people, lack of human capital is anything but an academic concept.

Building human capital appears to pay off for nations as well as individuals. International data show that virtually all of the newly industrialized economies whose growth rates have been so dramatic over the past thirty years, from Israel to Japan, had achieved universal or almost universal primary enrollment by 1965. The most successful of those economies also had achieved high secondary school enrollment rates and an almost universally literate labor force just before rapid and sustained industrial growth began (Lockheed and Verspoor 1991, p.3 and World Bank 1987). That countries' prosperity depends on their citizens' knowledge and skills is almost universally accepted today.

Beyond Productivity and Incomes

But the importance of human capital development goes beyond its contribution to productivity and incomes. Because better-educated people tend to make choices that are better for their health, there is often a strong relationship between years of schooling and health status. And parents' education--particularly the educational level of mothers--has a direct impact on children's health and academic achievement.

Perhaps most important, education can help reaffirm shared community concerns and interests, and reinforce a sense of national unity. An educated populace is necessary to a functioning democracy, more than ever today in the United States, when informed voting and decision making about policies for a diverse population with often conflicting views and needs is so difficult. In a society like ours, where knowledge and skills--not birth or class--determine your place in society, making sure that everyone has the knowledge and skills to support themselves and their families is insurance against the development of a permanently alienated, discontented group of people without a stake in our democracy. Investment in human capital is investing in the very future of our nations.

This is why it is so important to focus public discussion and public policy on developing human capital. But the challenge is enormous. Most of our education and training policies and systems are still preparing people for the "old order". We think of people in boxes by age group--those in K-12, those in college, those in the work force, the unemployed, those on welfare, retirees. We haven't had coherent human development policies that look across the lifespan. That is the current need --and that is what the current U.S. Administration is trying to do. Our human capital development agenda contains policies that address the needs of people from very early childhood through adulthood. In the next section, I'd like to review briefly the items on that agenda.

The Clinton Administration's human capital development agenda

The human capital development agenda that we have set out for ourselves is very ambitious. It has two distinguishing features.

First, investment in learning must be benchmarked to the highest standards, to be relevant to the needs of 21st century life and jobs. And high standards apply to all--not just to a privileged few. In our view, "access" for all isn't enough, if it means access to poor-quality programs with lower standards for some, and access to high-quality programs for others. Our new policies recognize that the only way to get real equality is to challenge *all* students to learn to the same high standards, and then provide the resources to make sure those starting out "behind" can reach the standards.

Two decades of cognitive research and numerous real-life examples show us that it is possible for students of all ages that we define as "at-risk" (for example, those in high-poverty schools, and those who are ~~limited-English proficient or migrant~~) to learn far more than we generally have expected of them. Expecting less of them almost guarantees failure. U.S. Secretary of Education Richard Riley put it clearly:

"The surest way to create an angry, violent nineteen-year-old dropout is to give that young person a watered-down curriculum from kindergarten on. When you do that, you are telling these young people early on that they aren't good enough, so why even try. And, I assure you, they do get the message. By fourth or fifth grade, they have already started to give up."

Secondly, the various laws and initiatives in our agenda reinforce each other and are linked to one another. They promote common goals and smooth transitions across programs and institutions. They provide learning opportunities across the lifespan.

We have been successful in enacting the following major parts of the agenda into law over the past 19 months, thus laying a strong foundation for lifelong learning and greater economic health in the United States:

- **Head Start**, our biggest early childhood program, has just been reauthorized. Head Start funding has increased from \$2.2 billion in fiscal year 1992 to \$3.5 billion in fiscal 1995. The new law is distinguished by its emphasis on improving program quality and by the new "Early Head Start" program for children from ages 0 to 3.
- **Goals 2000**, signed into law in May 1994, is a milestone in U.S. education, aimed at stimulating all of our states to undertake broad, standards-based educational reform. Goals 2000 provides a vision, framework, information, and seed money to enable states and local school systems to plan and implement coherent policies and practices aligned with high state standards for student performance. Goals 2000 represents a major change in the federal role away from the "band-aid" of fragmented categorical programs designed to "fix" small pieces of the system, toward true systemic reform.
- The recently enacted **Improving America's Schools Act** provides funds to support state reforms in teaching and learning, according to the framework laid out in Goals 2000. Programs in this law constitute the biggest federal

investment in primary and secondary schools. From now on, the progress of schools and local education systems will be measured against the kinds of high standards laid out under Goals 2000 for *all* students--including "at-risk" students.

This new law incorporates for the first time a major professional development title to prepare teachers to help all students achieve to the standards. It provides new resources to bring new technology into schools, make schools safe and drug-free environments, and engage parents as partners in learning. **Improving America's Schools** provides flexibility and technical assistance so that local districts can try innovative ways to meet the goal of high standards for all students; for example, by extending the school day or by setting up independently run charter schools. It authorizes demonstration projects that integrate educational, health, and social services designed to address risk factors such as poor nutrition, violence, inadequate health care, and substance abuse.

- The **School to Work Opportunities Act**, signed into law by President Clinton on May 4, 1994 and jointly administered by the U.S. Departments of Education and Labor, provides federal funds to state and local partnerships to help build systems to prepare young people for first jobs in high-skill, high-wage careers and for further education and training. In this law, the United States addresses for the first time in a coherent fashion the need for a strong alternative path for students who may not choose traditional college education right after secondary school, by allowing them to choose a career major and take advantage of links to postsecondary training and experiences in the private sector.

Every school-to-work program will include school-based learning and a program of study that meets challenging academic standards developed under Goals 2000. Each program also will include work-based learning--broad instruction in industry-specific skills, a sequential program of job training experiences with skills to be mastered at increasingly higher levels, and paid work experience with workplace mentoring. Students who complete school-to-work programs will receive *both* **diplomas** testifying to their academic competence and **skill certificates** that tell employers that they can handle jobs. In many countries in the world, that would hardly be revolutionary, but in our country, it is brand new.

- In addition, we have taken the first step to reform our **postsecondary student financial aid system**, to make postsecondary education and training more affordable and help take some of the risk out of borrowing to invest in higher education by giving borrowers the option of tying repayment to incomes. In 1993, federal student loan programs were changed so that a growing proportion of loans are provided directly by the federal government rather than through such intermediaries as banks and secondary loan markets. This

should save billions of dollars for students and for taxpayers by eliminating the "middle men." These are dollars that can be reinvested in people.

- A related effort is the **National Service Initiative**, through which a cadre of volunteers soon to be bigger than the Peace Corps ever was has begun serving their communities as teachers, social workers, and in other service positions. In return, participants will receive a stipend and an education award of \$4,725 for each year of service they perform, to pay back money they have borrowed for postsecondary education.
- The **Empowerment Zone and Enterprise Community** initiative launched in 1993 is one more example of investing in people. ~~Tax incentives to business,~~ community development banks to provide capital, and priority in receiving funds from other federal programs will enable these zones and communities, selected from among the most distressed urban and rural communities in America, to attract the jobs and the hope that they so desperately need.

I want to emphasize that all of these initiatives have passed during the past 19 months--a spectacular achievement. Not only that, but the substantial budget increases that accompanied their passage mean that we really are investing more in people. Still, the most exciting part of this achievement may be the way the separate laws and initiatives form part of a coherent whole--a vision of lifelong learning and human capital development. And we're not finished.

In the coming months, we will be examining strategies to reform our adult workforce training so that both the quantity and the quality of learning opportunities expands, and so that workers, potential workers, and displaced workers have easy access to the most up-to-date information about where the jobs are, what skills they need to get those jobs, where they can get those skills, and where to go for financial help. We will be reauthorizing our vocational education and adult education laws to complete our broad vision of reform. And we'll be working our hardest to implement successfully the laws we have already passed.

The importance of social capital

Early childhood education, high-achieving schools, national service, partnerships with business--these initiatives all form part of a lifelong learning strategy. But they have something else in common, something that too frequently is left out of the human capital discussion. They all recognize that families and communities are the keys to successful efforts to build and effectively use human capital. Ambitious as our legislative agenda is, even if we are successful in providing abundant and high-quality education and training opportunities, it won't be enough, without the motivation and interest that leads students to take advantage of those opportunities. Schools cannot do the job alone. The recipe for human capital development requires one more ingredient--what sociologist James Coleman calls *social capital*.

Social capital consists primarily of human relationships and the benefits dependable relationships confer on individuals. When children are important to a family and community, when adults spend time with them, when a web of supporting relationships, trust, shared norms and attitudes, and a sense of belonging are built up, social capital is high. And when social capital is high, human capital development works best.

In education, we have numerous examples of this tie between social capital and learning. Studies of individual families show that what the family does (for example, reading regularly to their young children) is more important to student success than family income or education. Research by Coleman, Bryk and others point to a strong sense of "community" as a contributor to keeping kids in school and fostering high achievement. And a whole body of literature on reclaiming school dropouts or potential dropouts also points to just how important a sense of community is to learning.

In John Gardner's words,

"A community has the power to motivate its members to exceptional performance. It can set standards of expectation for the individual and provide the climate in which great things happen. It can pull extraordinary performances out of its members...." (Gardner 1991, p.5)

How does this happen? Social capital sustains and nurtures individuals, keeping spirits up in the face of adversity and reinforcing successes. Social capital enables children to develop the "basics" for learning and achievement--a sense of self-worth, respect for themselves and others, commitment to quality, a positive attitude, shared responsibility, and a sense of community.

Yet close-knit communities are increasingly hard to find. An African proverb is quoted fondly and often in the United States these days: "it takes a whole village to raise a child." This proverb is intuitively powerful, but I suspect it is quoted so frequently partly because we recognize, nostalgically, that we do not have villages of that kind any more, or at least not in many places--the extended families, the stable neighborhoods where everyone knows and offers support to everyone else. We need to find ways to nurture social capital within the communities we do have, and find new communities to provide the same kind of warmth, attention, and support.

What we can do

We know less about how to increase social capital than we do about increasing physical or human capital. In particular, we are not sure how effective government programs can be in developing social capital. But I am convinced that if we ignore its importance, we will never reach our goals. Without adequate social capital, human capital development cannot take place.

Recognizing the key roles of family and community in developing human capital, on September 7 Secretary Riley launched the National Family Involvement Partnership for Learning with a coalition of about 50 major national parent and education organizations. Thirty other education, religious, business, and community-based organizations also signed on as partners for this initiative. The Partnership is a concrete step that recognizes, first, that parent and community support and involvement are indispensable to our efforts to build up human capital through improved schooling, and second, that we have the best chance of success when we use government to marshal the support of private citizens and community groups.

Human capital is a cold concept. After all, our increasingly sophisticated machines can store knowledge and execute tasks with skill. Societies can instill in their citizens certain facts and skills so that they can be economically productive--but that isn't our vision of a good society or an educated citizenry. Social capital may be less tangible than physical or human capital, but it is no less important to achieving our overall goals.

I think of social capital as being both a means to an end and an end in itself. It is a means to human capital development, because without strengthening the web of human relationships, without motivating our students to excel, our investments in schools and training mean little. It is also a goal, because strong communities, based on mutual help, mutual understanding, and mutual respect, are the places in which it is worth living and raising our kids.

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**THE ECONOMIC EFFECTS OF INVESTING
IN POSTSECONDARY EDUCATION**

Reauthorization Work Group on
Cross-Cutting Issues

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Expenditures on postsecondary education can be analyzed from many perspectives. One perspective that can provide many useful insights views individual and social expenditures on education as investment decisions. This view, referred to as human capital theory, provides a framework for critically analyzing the costs and benefits of investing in postsecondary education.

This paper presents findings concerning some of the economic effects of investing in postsecondary education. The paper is divided into four sections, which are briefly summarized below:

- o Economic Returns to Postsecondary Education: There are positive economic returns, both private and social, to enrollment in postsecondary education. These returns are most significant for bachelor's degree recipients--the return to other forms of postsecondary educational attainment are less clear.
- o Effects of Student Aid: Student aid in the form of grants improves access to postsecondary education, particularly for lower-income students. The effect of grants on choice and persistence and the effect of loans are less clear but also appear to be positive.
- o Returns to Student Aid: Comparing the Federal investment in student aid with the increased Federal tax revenues received due to the additional earnings attributable to student aid indicates that student aid is a profitable social investment under most assumptions.
- o Policy Implications: There are beneficial economic effects to the Federal investment in postsecondary education. However, the data are not sufficient to draw any conclusions about the most beneficial form or level of this investment. In addition, there are several other factors--importance of early aspirations and preparation in succeeding in college, importance of completion in attaining significant economic advantages from college, constraints on the supply of postsecondary education, and State and institutional aid offsetting Federal aid--that may limit the economic effects of student aid and need to be considered in formulating student aid policy.

Much of the data presented in this report come from a recently published book (Leslie and Brinkman) that analyzed the relevant literature on the economic value of higher education. This book is useful because it drew on much of the available work done in the field in reaching conclusions as to the most likely economic effects of postsecondary education. However, the book's findings were written from a given perspective--which has been criticized as overstating the benefits of postsecondary education and student aid-- and, therefore, should be viewed cautiously.

ECONOMIC RETURNS TO POSTSECONDARY EDUCATION

The economic returns to postsecondary education can be analyzed both from the private and the social perspective. Private returns are often analyzed by looking at earnings differentials--how much more college graduates earn, on average, than those with less education. In 1991 the median annual income of full-time workers 25 to 34 years old was nearly \$11,000 greater (\$30,882 versus \$20,063) for men with four years of college as compared to just 4 years of high school. This difference for women was also nearly \$11,000 (\$23,016 versus \$12,263). (Current Population Reports)

Therefore, for younger workers at least, there appears to be a significant premium for college attendance. This has not always been the case, however. In the early 1970s economists (Freeman) were concluding that America had reached a state of over-education where there was little economic benefit to additional investment in college. The college premium--measured as the ratio of median income with 4 years of college to that with 4 years of high school--for 25 to 34 year old men had declined from 30 percent throughout the 1950s to 25 percent by the mid-1960s and to only 15 percent by 1973. There was also some evidence of a similar, although much smaller, decline for women. (Levy and Michel)

Beginning in 1980, the downward trend in the income premium for college graduates began to reverse. For 25 to 34 year old men, the college premium increased to 30 percent in 1980 and 37 percent in 1983. By 1991 the premium for men was 54 percent, the highest it had been since at least World War II. There was an 88 percent premium for women. (Levy and Michel; Current Population Reports)

The recent increase in the college premium has been due to decreases in the real wages of high school graduates--the wages of college graduates have remained essentially the same in real terms. Earnings for high school graduates have declined as the availability of relatively high-paying manufacturing jobs diminished and were replaced with lower-paying jobs in the service sector. College graduates were able to maintain the real value of their earnings and, therefore, the differential as compared to less-educated workers grew. (Levy and Michel).

The premium received by college graduates provides a strong economic incentive, on average, for private investment in higher education. Whether the investment makes economic sense for any particular individual depends upon their cost of obtaining additional education and the expected success of their educational and occupational endeavors.

Another way to view private returns is to compare the cost of obtaining a higher education with its benefits measured as the value of the increased earnings attributable to that education over a person's lifetime. Costs and, in particular, benefits must be discounted to reflect the fact that money in the future is worth less than money today. In addition, benefits must be adjusted to account for expected real growth in the economy which increases the purchasing power of workers.

Calculations of the future costs and benefits of education are very sensitive to the discount and growth rates chosen for the analysis. The lifetime earnings differential attributable to 4 years of college versus a high school degrees using 1987-1991 Census data ranged from \$2.3 million for men and \$1 million for women with no discount rate and a 2 percent growth rate to \$400,000 for men and \$200,000 for women with a 5 percent discount rate and no growth rate. This indicates that even under very conservative assumptions, there is a significant return to completing a college education. (Goldenberg)

Disaggregating lifetime earnings estimates by years of schooling can help to determine the effect that each additional year of education has on earnings. This analysis reveals a substantial premium for completing college--compared to completing 3 years of college, men who complete 4 years of college earn 34 percent more over their lifetime and women earn 25 percent more. The increase from 3 to 4 years of college is two to three times higher than the increase attributable to any other additional year of postsecondary education (e.g., from high school to 1 year of college, etc.). (Goldenberg)

Typically the net benefit of additional education is not expressed as a dollar amount but rather as an internal rate of return--the discount rate that would set the value of earnings equal to costs. This rate can then be compared to the rate received on other investments. Leslie and Brinkman concluded that the current private internal rate of return for a bachelor's degree was between 11.8 and 13.4 percent, for one year of graduate work about 8 percent, for a master's degree about 7.2 percent, and for the Ph.D. about 6.6 percent. These rates are significantly above the rates found during the mid-1970's but are similar to historic levels.

The data presented above relates only to differences between high school and college graduates. A great many people, either by design or circumstance, participate in postsecondary education without receiving a bachelor's degree yet little work has been done on their return to postsecondary education.

The work that has been done (Kane; Grubb; National Assessment of Vocational Education) yields contradictory evidence regarding the return to postsecondary education that does not result in a bachelor's degree. Some studies have shown little economic gain for students receiving less than a bachelor's degree while others have found positive returns, particularly in certain fields. There is general agreement, however, that whatever the return it is far less than the return to a bachelor's degree. Currently, Kane is preparing a short paper under contract to the Department describing the latest analyses and data on the returns to sub-baccalaureate education.

This comparative advantage enjoyed by students completing college suggests that some of the economic return to postsecondary education may be due to a credentialling or signalling phenomena as opposed to the specific skills learned in college. Receipt of a bachelor's degree signals to the labor market that a person possesses certain desirable skills. Non-bachelor's degree recipients may also possess these skills but there are substantial information gathering costs to employers to determine this. Therefore, employers often may base employment decisions on possession of a specific credential, such as a bachelor's degree, as a cost-effective way of making decisions about skilled personnel.

Investment in higher education provides not only private but social economic returns as well. The social benefits of higher education are usually assessed in three ways (Leslie and Brinkman):

- o Social Rate of Return--compares social benefits as measured by the pretax earnings of individuals to social costs as measured by the education and general expenditures of institutions plus the foregone earnings of students while in school. Converted into a rate comparable to an interest rate, studies have found the social rate of return on undergraduate education to range between 11.6 and 12.1 percent.
- o National Income Growth--estimates the portion of national income growth attributable to higher education and related activities. This portion is estimated to be between 15 and 20 percent for education in general and 4 to 5 percent for higher education, with another 20 to 40 percent probably deriving from improvements in knowledge and its applications.
- o Economic Impacts--measures the spillover effects that colleges have on the local economy. These impacts amount to roughly \$1.50 to \$1.60 in increased business volume for every \$1 of the college operating budget and 59 jobs per \$1 million dollars of the college budget.

Both from the private and social perspective, economic returns are not the only beneficial result of postsecondary education. Exposure to college life can provide significant consumption benefits to the student in terms of the opportunity to engage in intellectual and social activities. Additional education also provides benefits to society in terms of a lower likelihood of engaging in activities that are expensive to society--crime, welfare utilization, etc.--and increased civic activity. While difficult to quantify, these non-monetary benefits have been estimated to be as important to society as economic benefits and should be considered when evaluating the effects of investing in postsecondary education. (Leslie and Brinkman)

The above data reveal significant economic returns to postsecondary education. However, these returns are not necessarily attributable to education. They may be caused by preexisting differences--ability, motivation, parent's education, income, and occupation, etc.--between college attenders and nonattenders. Studies done controlling for these preexisting differences, when combined, estimate that 80 percent of the additional return to a bachelor's degree can be attributed to education. (Leslie and Brinkman) As discussed above, this 80 percent attributable to education may not be solely or even mostly attributable to what students learn but rather just the possession of the necessary credential.

EFFECTS OF STUDENT AID

The primary goal of Federal student aid is to help equalize the opportunity to participate in postsecondary education. Success toward achievement of this goal is usually measured by analyzing the effect of student aid on access, choice, and persistence. If successful, student aid should remove financial barriers that might prevent students from enrolling in college, unduly restrict their choice of college, or cause them to leave college prematurely.

Leslie and Brinkman combined results from numerous studies using different analytic approaches and came to the following conclusions regarding the effects of student aid:

- o Access--between 1 and 1.3 million full-time students were enrolled in 1982-83 because of the availability of grant aid. Presented in marginal terms, for every \$100 increase in grant aid, there would be approximately a 1.6 percent enrollment increase among those offered aid. These findings varied substantially by income. Between 20 and 40 percent of low-income enrollment could be attributed to grants while the effect of grant aid on middle-income students was only about half as large--10 to 20 percent of enrollment--and inconsequential for high income students.

The effect of student aid also varied by sex, ethnicity, and ability. The results regarding ethnicity and sex were conflicting although a recent report (Jackson) found larger enrollment effects of a scholarship offer for blacks (11 percent) than for whites (6 percent) or Hispanics (3 percent) after controlling for background characteristics. There was a consensus in the studies that aid had a much larger enrollment effect on lower-ability students indicating perhaps that these students require a cost reduction to make college a profitable investment.

- o Choice--institutions can improve their ability to recruit students by using student aid in situations where students are clearly choosing between two or more institutions. The effect of Pell Grants on choice is much less clear partly because its availability is so widespread. Some studies found that the Pell program did contribute to a shift from less costly to more costly institutions. Others showed Pell mostly affecting access with additional enrollment occurring in less selective, less costly schools. Like access, the effect of student aid on choice was most pronounced for lower-income students.
- o Persistence--student aid permits aid recipients to persist about as well as nonrecipients. Given that many experts feel that students do not typically drop out of school because of financial considerations, it may be that student aid has worked well enough so that concerns about persistence can legitimately be focused on non-economic dimensions of student life. Other results indicate that (1) the size of the persistence effect has grown in recent years; (2) nonwhite aid recipients do not persist as well as white recipients; and (3) persistence is enhanced by larger amounts of aid.

If the positive effects of student aid reported by Leslie and Brinkman are correct, then one would expect to see participation rates of low and high income students converging over time as student aid increased. One study (Hansen) which looked at participation rates between 1971-72 and 1978-78--a period of great expansion in student aid--found no reduction in the ratio of the enrollment rates of below- to above-median-income families. From this Hansen concluded "that the greater availability of student financial aid, targeted largely toward students from below-median-income families, did little, if anything, to increase access".

A study commissioned by the Department (McPherson and Schapiro) attempted to reconcile the findings reported by Leslie and Brinkman with those looking at participation rates over time.

This study also analyzed participation rates over time. Unlike the earlier studies, however, it employed statistical controls, accounted for the variation in the distribution of Federal student aid over time, and analyzed separately the enrollment behaviors of students from different income groups. The study also included both grants and loans in the analysis. The conclusion from this much more careful analysis of the time series data are broadly similar to those reported by Leslie and Brinkman--that student aid does significantly improve access for lower-income students but has little or no effect on the enrollment of middle- or upper-income students.

One question not often addressed in the studies done to date is the relative effects of different forms of aid. Two studies reviewed by Leslie and Brinkman regarding access concluded that loans and work-study were less effective than grants in stimulating enrollment among lower-income students but that loans were effective in encouraging enrollment among middle-income students.

More work has been done on the relative effect of different forms of aid on persistence. Leslie and Brinkman concluded that, "when aid forms are compared to one another, grant and scholarship aid have a more positive effect on persistence than do loans." Two recent studies using data from the High School and Beyond study (Carroll, St. John) came to opposite conclusions about the effect of different types of aid on persistence. Carroll concluded that only large grants had a positive effect on persistence while St. John found that all types of aid--loans, grants, and work study--improved persistence.

Based on the success of the work by McPherson and Schapiro, PES has commissioned two additional papers that analyze participation rates over time. Kane is examining how recent differences in rates of tuition increases across states have affected the rate at which high school graduates enter postsecondary education by state. Dynarski is analyzing how changes in GSL eligibility over time has affected students' decisions about whether and where to enroll in postsecondary education. Results from both studies should be available in approximately six months.

In conclusion, there is still much we do not know about the effects of student aid. There is a fair amount of consensus that student aid in the form of grants does improve access, particularly for lower-income students. The effect of grants on choice and persistence are less clear although much of the evidence suggests that there is a positive impact on these outcomes as well. The effect of loans, however, needs to be studied in much greater depth. From the limited evidence available, loans do appear to improve access for middle-income students and, at least in some studies, were also found to improve persistence.

In comparing the effects of loans and grants, it must be remembered that grants are a far more costly way--how much more costly depending on the degree of subsidization of the loans--of making a given amount of aid available. Therefore, loans may still be an efficient way of increasing access, choice, and persistence even if, for a given amount of aid made available, they are less effective than grants. Also students often receive both loans and grants and the effect of combinations of aid has rarely been addressed in a systematic way.

RETURN TO STUDENT AID

Data from the prior two sections suggest that increased educational attainment is economically profitable and that student aid can help promote educational attainment. A next step would be to combine these results to analyze the return to the Federal investment in student aid. In a study done under contract to the Department (Pelavin Associates) and subsequently updated by PES staff, such an analysis was undertaken the results of which are presented below.

The study compared the benefits of student aid as measured by the increased tax revenue attributable to student aid to the Federal costs of providing this aid. This is obviously a very limited measure of the effectiveness of student aid and in no way captures all the benefits or costs attributable to the Federal student aid programs. However, it does provide useful data for evaluating some of the economic effects of the student aid programs.

Estimating the tax revenue gain attributable to the Federal expenditure on student aid requires making the following determinations:

- o The amount of earnings differential associated with each level of postsecondary attainment as compared to a high school degree. Data from Census cited earlier (Goldenberg) were used in making these estimates.
- o The portion of the earnings differential that is attributable to education as opposed to preexisting differences between college attenders and nonattenders. Three different assumptions were used--80 (corresponding to the estimate in Leslie and Brinkman), 90, and 100 percent.
- o The portion of educational attainment that is attributable to Federal student aid subsidies. Estimates were taken from Leslie and Brinkman that there would be a 1.55 percent increase in low-income enrollment for every \$100 increase in grant aid and adjusted to account for the effect on middle- and upper-income students and the effects of loans and work-study.
- o Multiplying the above three estimates together provides an estimate of the amount of earnings differential attributable to student aid.
- o Applying the appropriate tax rates, assuming a standard deduction, to the above earnings estimates provides an estimate of the additional tax revenue attributable to the Federal student aid programs.

Comparing the tax revenues to the Federal cost of providing student aid provides a limited measure of the effectiveness of student aid. As before, the estimates are very sensitive to the assumptions made concerning discount and growth rates. Assuming a 5 percent discount rate and a 2 percent growth rate, the return to a \$1 of student aid ranged from \$1.24 for men with 1 year of college to \$8.45 for men with 5 or more years of college. For women, the return was smaller--\$.64 for 1 year of college and \$5.02 for women with 5 or more years of college. As before, there was a significant increase in the return going from 3 to 4 years of college.

POLICY IMPLICATIONS

The above results indicate that there are beneficial economic effects accruing to the Federal Government from its investment in student aid. Unfortunately, the results are not such that we came come to any conclusions regarding the most beneficial form or magnitude of this investment. Further work may shed some light on these issues although there are inherent limitations to what can be learned from the existing data. The only way to address certain effectiveness issues--for example, which specific types of aid are most effective and at what levels--would be through controlled experiments, which are extremely difficult to implement and also have moral implications.

Analyses of the economic effects of student aid can help us evaluate proposed changes to the student aid programs even if they don't lead to specific recommendations about the form and magnitude of that aid. To be economically beneficial, student aid has to alter behavior. While there may be reasons for society to subsidize behavior people would engage in anyway, this will not provide economic benefits. This distinction leads to the following points that should be kept in mind when evaluating the potential economic effects of changes in Federal student aid:

- o Importance of Early Aspirations and Academic Preparation: Most research has concluded that college entrance and success is predicated on decisions and efforts made very early in a students educational career. There is a strong positive relationship found between early aspirations for college, courses taken in high school, and college-going rates. The high percentage of academically prepared high school students already going on to college indicates that large increases in enrollment must come from students who currently are not considering or prepared for college. Student aid will, therefore, only have a marginal effect on enrollment if its influence is only felt in the 12th grade.

While its possible that large increases in the current student aid programs might affect students early behavior, most evidence is that students are relatively unaware of the availability of student aid. Unless a way can be found to greatly increase the pool of students who want to and are capable of attending college, student aid will not be successful at greatly increasing access to college.

- o Importance of College Completion: The data on economic returns indicates that large benefits from postsecondary education occur mostly for those completing a bachelor's degree. A majority of financial aid recipients, as well as postsecondary students in general, do not complete a bachelor's degree. From an economic standpoint, therefore, it would make sense to structure student aid in order to better encourage bachelor's degree completion. This might entail limiting student aid in certain types of schools and/or providing incentives for students to complete their degrees. Unfortunately, these types of changes conflict with some of the important non-economic goals of the student aid programs, particularly those relating to equity. Economic returns then have to weighed against other societal goals in determining the best way to structure the student aid programs.

- o Supply Effects: Student aid is designed to affect students' behavior. Even if students' behavior is changed, student aid will not be effective unless the supply of postsecondary education provided by institutions can accommodate these changes. For example, increasing the demand for postsecondary education will not be helpful unless institutions are capable of meeting this additional demand. In considering marginal changes in student aid, it is probably safe to ignore supply considerations. In considering larger changes in the student aid programs, however, it is important to analyze the potential effect the change will have not only on students' demand for education but also on institutions' supply of education.
- o Institutional and State Behavior: Federal student aid operates by effecting the net price of education faced by students. An important issue, however, is whether changes in Federal aid will actually cause a change in net price. If, for example, increases in Federal aid lead to decreases in State or institutional aid or increases in tuition, then the effect of the change in Federal aid would be at least partially offset. It is not clear how important these potential offsets might be. States and institutions have argued recently that declines in Federal aid have forced them to increase tuition and their own aid awards. An increase in Federal aid might, therefore, invoke the opposite response.

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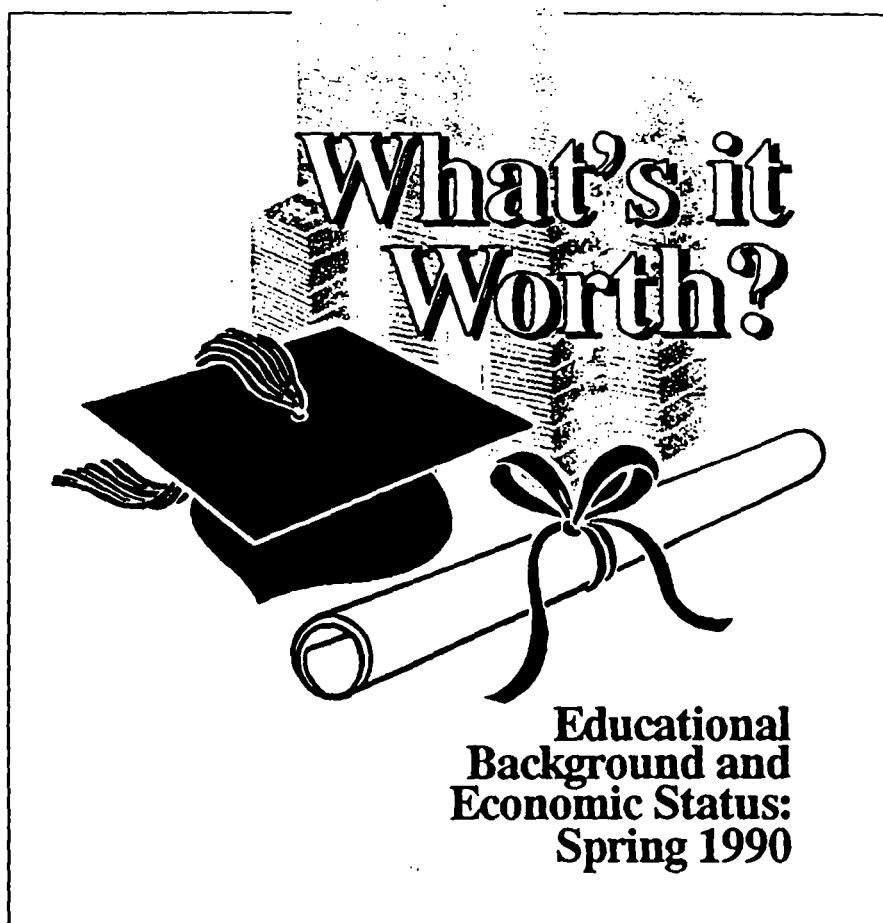
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CURRENT POPULATION REPORTS
Household Economic Studies

P70-32
Issued December 1992



by Robert Kominski and
Rebecca Sutterlin



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Barbara Hackman Franklin, Secretary
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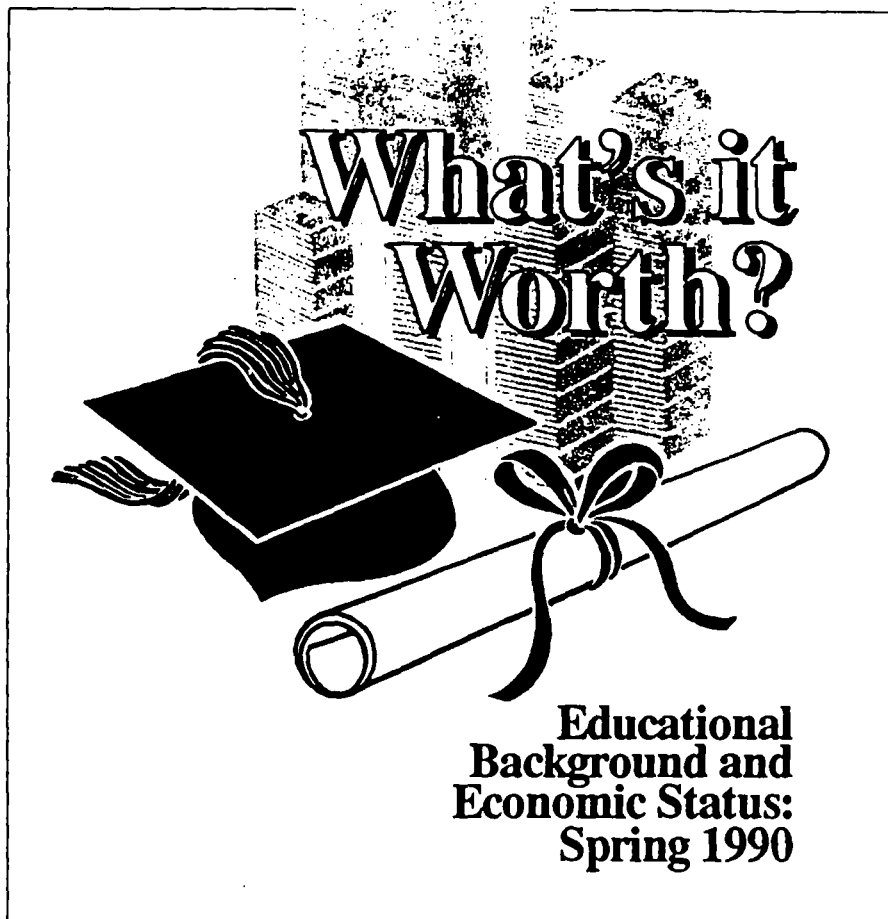
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What's It Worth? Educational Background and Economic Status: Spring 1990

Highlights

- About 25.2 percent (± 4) of the adult population in 1990 had obtained a degree beyond the high school level; this is a significant increase over the levels of 20.7 (± 4) in 1984 and 23.3 percent (± 5) in 1987.
- While 19.4 percent (± 4) of Whites had not completed high school, 31.9 percent (± 1.0) of Blacks were not high school graduates. An even greater proportion of Hispanics, 43.8 percent (± 1.6), did not have a high school diploma.
- Across race and sex groups, since 1984, there was a general increase in the proportion of persons with a degree beyond high school, and a decrease in the proportion who had not completed high school.
- Of all persons with degrees beyond high school, the highest mean monthly incomes were reported by persons with professional degrees, \$5,554 (± 731).
- On average, Blacks earn significantly less than Whites at each educational level except at the Master's level where there is no significant difference. (There are not enough cases at the professional and doctorate levels to make a comparison.)
- The greatest concentration of degrees was in business. Of all individuals reporting post-secondary degrees, 19.2 percent (± 7) were in the field of business.
- A large proportion of all professional/doctorate degrees, about 56 percent (± 3.3), were composed of just two fields: law and medicine/dentistry. On the other hand, around 47 percent (± 2.1) of all master's degrees were in the fields of education and business/management.
- While 15 percent (± 9) of highest earned degrees held by men were in the field of engineering, only 2 percent (± 3) of degrees held by women were in this field.
- Controlling for inflation, no single educational level experienced a significant increase in average monthly earnings in the period from 1987 to 1990, despite a slight increase in the earnings for the total population.
- The average monthly earnings for persons with a bachelor's degree was \$2,116 (± 66). Variation by field ranged from \$906 (± 250) for home economics majors to \$2,953 (± 216) for engineering majors.
- While 3 out of 4 adults with a bachelor's degree completed their degree within six calendar years of high school graduation, only 43.2 percent (± 1.0) finished their degree in 4 years or less. The average time to complete a bachelor's was 6.21 (± 1.1) years after high school completion.
- The proportion completing a bachelor's degree within four years after completing high school varies by race and gender. About 44 percent (± 1.1) of Whites obtained a bachelor's degree within 4 years of high school graduation compared to around 33 percent (± 3.4) of Blacks. A higher proportion of women (49 percent, ± 1.5) completed the bachelor's within 4 years than did men (38 percent, ± 1.3).
- The majority of advanced degree holders held either a professional specialty occupation (57.3 percent, ± 1.9) or an executive, administrative, or managerial position (20.1 percent, ± 1.5).
- About one in four persons between the ages of 18 and 64 reported that they had, at some time, received training designed to help find a job, improve job skills, or learn a new job. A large proportion of these individuals (34.0 percent (± 9)) had obtained the training on their current job.
- Whites (26.2 percent, ± 5) were more likely to have received work-related training at some time than were Blacks (23.7 percent, ± 1.0). Only about 17.8 (± 1.3) percent of Hispanic persons had at some time received work training.

INTRODUCTION

This report presents tabulations from the Survey of Income and Program Participation (SIPP) regarding the educational attainment and associated social, economic, and demographic characteristics of the population of the United States. Education is often measured by the number of years of schooling an individual has completed. In this report, educational attainment is based on formal degrees received and the field of study in which the degrees were obtained. The primary tabulations in this report show numbers of persons by their highest attained degree and the field of the degree, along with some basic measures of their current economic status. Another tabulation provides information about the type

of work-related training programs in which individuals have been involved. This report also includes tabulations not available in previous versions. The new tabulations show the number of persons by highest degree, field, and current occupation, as well as some information on the average length of time spent in obtaining bachelor's and higher degrees.

This analysis is based on data collected as part of the second wave (interview) of the 1990 SIPP panel. These data were gathered in the 4-month period from June through September 1990. The text and several tabulations follow the same format as two previous reports of the same title in this series (P-70, No. 11; P-70, No. 21). Some comparisons between 1984, 1987, and 1990 are reported throughout the text.

DEGREE ATTAINMENT OF THE POPULATION

Table 1 presents data on degree status by sex, race, and age for the United States population 18 years and older. Degree status as discussed in this report has been defined to include the following mutually exclusive categories: persons who have not completed high school, those completing high school only, persons who have attended post-secondary school but did not receive a degree, persons with vocational degrees and certificates, associate degrees, bachelor's degrees, master's degrees, professional degrees, and doctorate degrees. [NOTE: Individuals were asked to identify their "highest" degree, and their implicit ordering of degrees was not examined. Whether one degree actually represents "more" education than some other degree is not at issue; while data may show the highest value on some scale (say, income) for one degree, the same degree could result in less than the highest score on another scale (e.g., years to complete the degree).]

Degree attainment is increasing among the adult population. In 1990, the largest proportion of the adult population reported a high school diploma as the highest degree (53.9 percent). One out of three people with a high school diploma as their highest degree had also attended, but not received a degree from, a postsecondary institution. A sizable proportion of the adult population, 20.8 percent, reported not completing high school. Figure 1 shows a decline since 1984 in the proportion of the population without a high school diploma. One adult in four, 25.2 percent, obtained a degree of some type beyond high school; this was an increase over the 20.7 percent and 23.3 percent observed in 1984 and 1987, respectively.

Figure 1 summarizes the distribution of attainment categories for some major demographic subgroups in 1984 and 1990. In 1990, while 27.0 percent of men held degrees above the high school level, only 23.7 percent of women held degrees. Women were less likely than men to have an advanced degree, but more likely to have an associate or vocational degree.

The difference between Whites and Blacks was substantial: 26.4 percent of Whites held degrees beyond high school, compared with 14.0 percent of Blacks. Furthermore, a much larger proportion of Blacks than Whites had not completed high school (31.9 percent vs. 19.4 percent). The proportion of the Hispanic population holding degrees beyond high school (11.6 percent) was below that of both the total White population and the total Black population. (NOTE: Persons of Hispanic origin may be of any race.) In addition, the proportion of Hispanics without a high school diploma (43.8 percent) was much greater than that of Whites (19.4 percent) or Blacks (31.9 percent).

Examining the data by age groups (figure 2) shows the change in the education of the adult population that has taken place over the last half-century, as well as in the last 6 years. (The 18 to 24 age group has lower levels than might be expected because this group has not completed its schooling.) While about 14.8 percent of persons over age 64 had a degree beyond high school, 31.3 percent of 25 to 34 year-olds had already obtained a degree. On the lower end of educational attainment, only 12.5 percent of persons 25 to 34 had not completed high school, compared with 28.6 percent of those aged 55 to 64 and 42.1 percent of persons 65 and older.

Figures 1 and 2 also show educational attainment levels as estimated in the 1984 SIPP. Comparing 1984 to 1990 for each of the groups age 25 and above, the data show a general pattern of increase in the proportion of persons holding degrees and a corresponding decrease in the proportion not completing high school. The same pattern is apparent for the race and gender groups shown. We have no comparable data from 1984 for persons of Hispanic origin.

DEGREE LEVEL AND ECONOMIC STATUS

Independent of the personal enrichment and value that one derives from additional schooling, it is often assumed that there is positive economic return associated with the attainment of higher education. For example, a specific degree may be a formal requirement for a job or promotion which in turn may lead to a financial gain.

Table 2 shows three basic measures of economic status for the degree categories previously described. The first of these is mean monthly income, defined as the total income received by the person during the 4 observation months of the survey, divided by four. Income includes wages and salary, as well as any other money income (i.e., pensions, paid benefits, interest, and dividends). The second measure, mean monthly earnings, is computed as the total of all earnings over the 4-month period divided by the number of months in which earnings were actually received. Earnings refers

Figure 1.

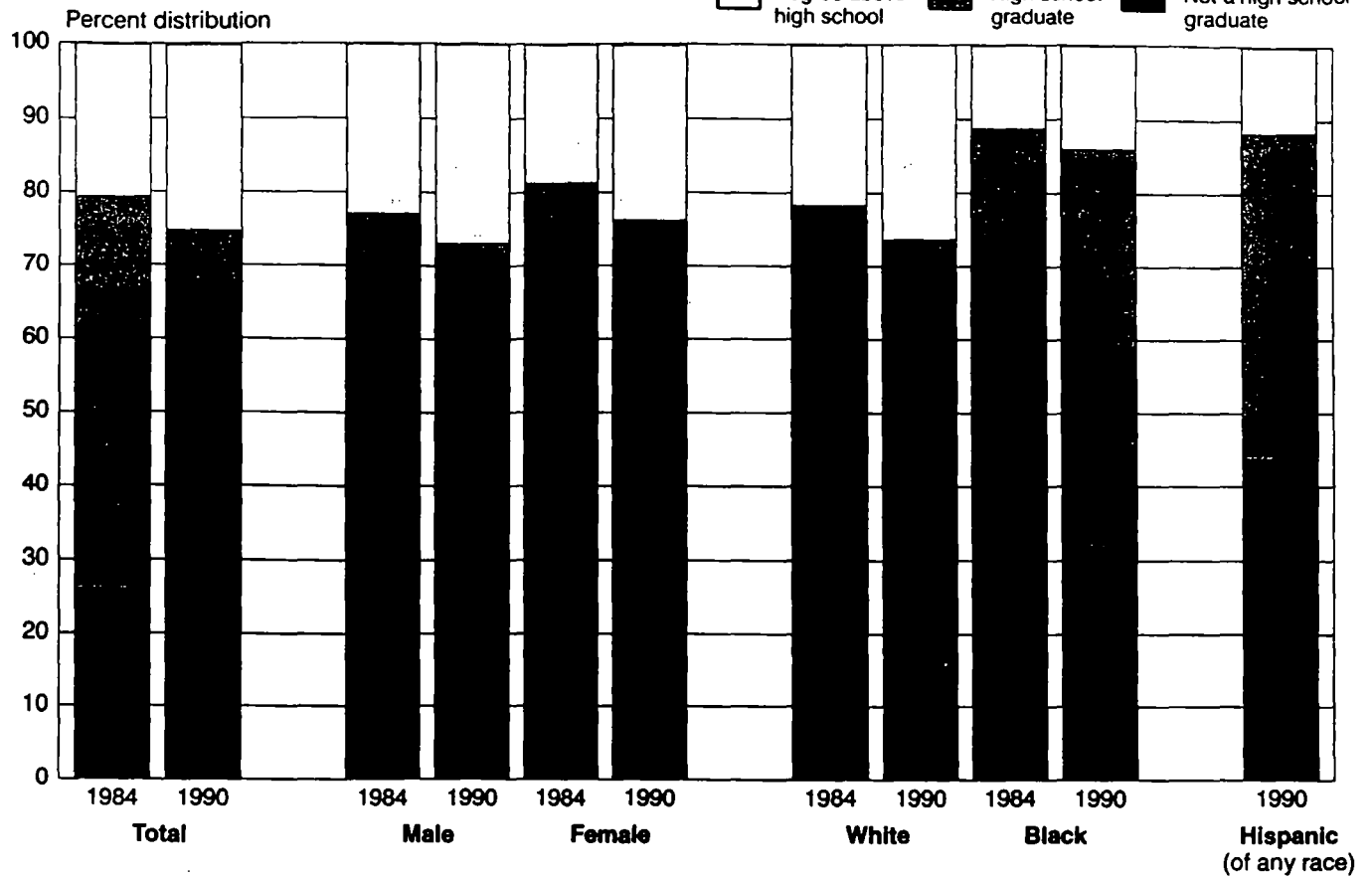
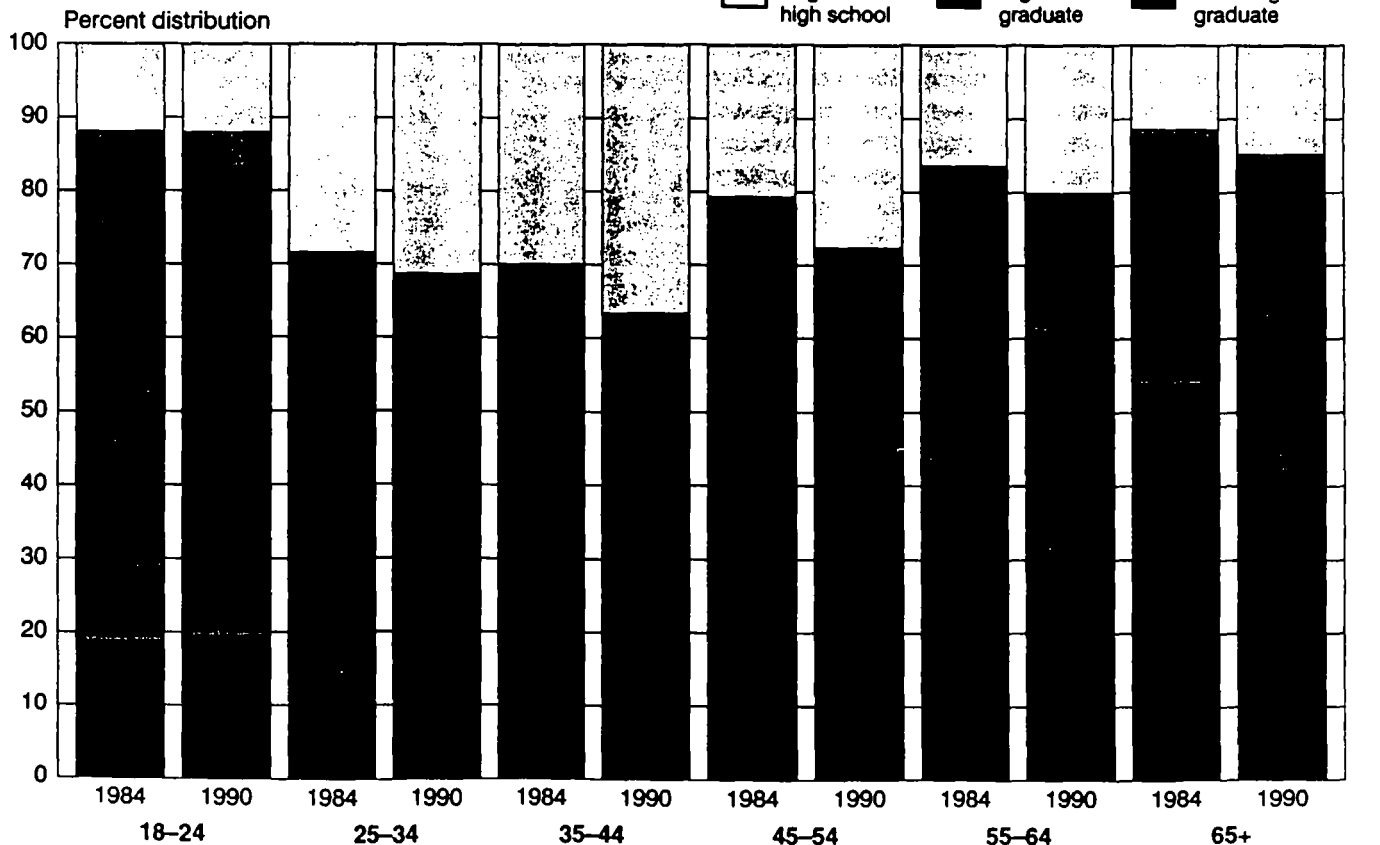
**Educational Attainment, by Sex, Race, and Hispanic Origin for Persons
18 Years and Over: Spring 1984 and Spring 1990**


Figure 2.

**Educational Attainment, by Age Group for Persons
18 Year and Over: Spring 1984 and Spring 1990**


to wages and/or salary from one or more jobs (includes earnings from self-employment). Mean monthly earnings are calculated this way because some jobs are seasonal, may not pay on a regular monthly basis, or because persons may have only recently begun or ended a job. The third measure, months with work activity, gives a general idea of the amount of employment during the 4-month period. For each month that the individual held a job, whether for the entire month or only a few days, a value of "1" is recorded. This includes persons who may have only had a job for a week or two and spent the remainder of the month looking for a different job, was on layoff, or who left the labor force (without a job and not looking). Persons who did not have a job at any time during the month, regardless of whether they were looking for one or not, receive a value of "0" for that month. Persons reporting a job in all 4 months would have a value of "4", while those who reported a job in no months have a value of "0".

Table 2 provides the estimates of these three measures for each of the degree groups for all persons 18 and older. The data show that there are substantial differences, both in terms of income and earnings, between some of the degree levels beyond high school. The highest value for mean monthly income and earnings was reported by persons with professional degrees, while the lowest was given by persons with vocational degrees.

Except for the comparison between doctorate and professional degrees, most degrees beyond high school had significantly higher income and earnings associated with them than the next lower degree. In addition, the mean income and earnings for persons with only a high school diploma (whether they have some college with no degree or only a high school diploma) were substantially higher than for those persons who did not complete high school. In short, the basic time-honored relationship between education and economic returns is verified by these data.

The utility of the third measure, months with work activity, should not be overlooked. Even with this gross measure it is possible to see that there are differences between some degree levels with regard to monthly employment. On the average, persons with associate degrees or higher held jobs in at least 3 of the 4 months observed, while persons who were not high school graduates held jobs in fewer than half the observed months.

There are substantial differences in earnings and income between men and women at each degree level, with the mean amount for males consistently higher than that for females. The work activity data show that on average men have more months with work activity than do women. This pattern in work activity holds true for each education level below the professional and doctorate degrees.

Differences in earnings and income also existed between race and ethnic groups. Due to the small sample size, comparisons between Whites, Blacks, and Hispanics cannot be made for two degrees: doctorate and professional.¹ The mean monthly earnings of Whites was significantly larger than that of Blacks at each level, except at the master's level where there is no statistically significant difference. Comparisons at each education level show that Hispanic earnings are lower than those for White persons at two levels: bachelor's degree and high school diploma as highest degree, but not significantly different from Blacks (except for persons who have not graduated high school where the earnings for Hispanics were significantly higher than those for Blacks).

Table A shows the average monthly earnings in each degree category for 1987 and 1990 and for each gender and race. Earnings for 1987 are adjusted to constant 1990 dollars using a factor of 1.15 based on the Consumer Price Index (CPI-U-X1 series) for 1987. Although total average earnings experienced a slight increase, none of the individual categories of degree holders saw a significant rise in earnings from 1987 to 1990. Apparent increases for persons with professional and master's degrees do not meet tests of statistical significance after adjusting to 1990 dollars. While monthly earnings for women rose slightly from 1987 to 1990, those for men were essentially unchanged. During the same period, Whites experienced an overall significant increase, but Blacks did not.

DEGREES AND FIELDS OF STUDY

As the data in table 2 illustrate, there are clear economic advantages in the attainment of post-secondary degrees. However, these degrees are granted in a wide variety of fields, and as demand for an area of expertise varies, so too should the number of persons who choose a given field of study and the rewards they receive. As part of the data collected, persons were asked to report the field of training in which their highest degree was received. Respondents were given a flash-card with 20 possible choices (see appendix E) and asked to choose the field which most closely matched the area of their own degree. Table 3 shows the field of degree by sex and race for all persons with postsecondary degrees, combining doctorate and professional degrees into one category.

The first panel of the table shows the diversity of the fields of training for the various degrees. The short list of 20 fields seems to provide a reasonable number of options, with only 7 percent of all respondents choosing the "other" category as the field of their highest degree.

¹In general, care should be taken in comparing mean estimates when sample bases are relatively small.

Table A. Average Monthly Earnings by Educational Level, Sex, and Race: Spring 1987 (Adjusted) and Spring 1990

Educational attainment	1990 earnings		1987 earnings		
	Mean	Standard error	Original mean	Adjusted mean ¹	Adjusted standard error
TOTAL, 18 YEARS AND OVER					
Both sexes	² \$1,284	\$15	\$1,075	\$1,237	\$15
Doctorate	3,855	304	3,637	4,184	597
Professional	4,961	455	4,003	4,606	396
Master's	2,822	202	2,378	2,736	78
Bachelor's	2,116	41	1,829	2,104	44
Associate	1,672	51	1,458	1,677	58
Vocational	1,237	50	1,088	1,252	70
Some college, no degree	1,280	31	1,088	1,252	25
High school graduate only	1,077	16	921	1,060	15
Not a high school graduate	492	12	452	520	16
Male, 18 years and over	1,792	24	1,540	1,771	27
Female, 18 years and over	² 819	17	652	750	11
White, 18 years and over	² 1,334	18	1,116	1,283	16
Black, 18 years and over	894	28	766	881	28

¹1987 dollars adjusted to 1990 using an inflation factor of 1.15 derived from the Consumer Price Index (CPI-U-X1 series).

²Indicates 1990 amount is significantly greater than 1987 amount.

Some fields are clearly associated with one or two degree types - law and medicine with doctorate/professional degrees, for example; while others such as business and education are represented at several different degree levels.

Different degrees are also associated with one or two fields. For instance, about 56 percent of all professional/doctorate degrees were in just two fields: law and medicine/dentistry. Around 31 percent of all master's degrees were in education with an additional 17 percent in business/management; these same two fields represent a large proportion of those with bachelor's degrees. Business/management pairs up with nursing/pharmacy/technical health to make up about 38 percent of all associate degrees; while the majority of all vocational degrees were in nursing/pharmacy/technical health and vo-tech studies (63 percent). Overall, the largest single field was business which accounted for 1 in 5 degrees.

There are several notable differences between the sexes with respect to degree fields. While 23 percent of men with degrees held them in business/management, only 15 percent of women held their degree in this field. Approximately 15 percent of men held an engineering degree, but just 2 percent of women with a degree were in this field. A large share of women's degrees were in other fields: 21 percent in education and 16 percent in nursing/pharmacy/technical health. In contrast, these same fields accounted for only 7 percent (in education) and 2 percent (in nursing/pharmacy/technical health) of degrees held by men. In general, these patterns are very similar to those found in 1984 and 1987.

FIELDS OF STUDY AND ECONOMIC STATUS

Each year, many college students are faced with one of the most difficult decisions in college — the choice of a major. For some students, the choice reflects a pattern of interest that has developed over time; for others, the choice may be motivated by other factors. One factor which enters into the choice of field of study for many students is the perceived economic rewards that may accrue from a degree in a chosen field. To a large extent, ultimate financial rewards may result more from the skills of the individual, the specific job they take, and the relative demand for the type of position they occupy. Nevertheless, one's field of training has some bearing on these factors and consequently on eventual economic outcomes. Table 4 shows the summary economic measures previously discussed by various fields and types of degrees. Because the SIPP is a sample survey, there are not always enough sample cases to provide statistically reliable estimates of every field and degree combination. The panels of table 4 have been chosen to produce tables where most cells have an estimated base of at least 200,000 persons.

The first panel of table 4 shows the average monthly income, earnings, and work activity by field for all persons age 18 and above with a degree beyond high school (average monthly income, earnings, and work activity are defined as those in table 2). Variations specific to degree levels are not controlled in these data, but field-specific variations are still evident. Degrees in the fields of law and medicine/dentistry are associated with the highest average monthly earnings, while

those in home economics are the lowest. Regardless of field, persons with a degree beyond high school had average monthly earnings that were substantially larger than those of persons with either a diploma only or some college and no degree (\$2231 vs \$1077 and \$1280, respectively).

Table B compares the average monthly earnings of various fields of bachelor's degrees for 1987 and 1990. The values for 1987 have been adjusted to 1990 dollars using the same factor as in table A. While the overall monthly earnings of all bachelor's degree holders for 1990 was comparable to 1987, table B shows several fields experienced significant changes between the given years. Persons with degrees in physical/earth sciences and nursing/pharmacy/technical health had significantly higher earnings in 1990 relative to 1987 adjusted earnings. The residual category of other fields also saw an increase in earnings. The average monthly earnings declined in the field of business/management.

TIME SPENT TO EARN A DEGREE

As these data indicate, a post-secondary degree quite often has positive economic outcomes associated with it. As the time taken to obtain a degree increases however, so too does the delay to future economic gain based on the degree credential. The data in table 5 describe the average time individuals spend to obtain a bachelor's degree. Two types of measures are used, the proportion completing a baccalaureate within a

given number of years and the mean duration from the end of high school to award of the baccalaureate. All measures in table 5 use the date of high school graduation as a starting point. The data include all persons who have a bachelor's degree regardless of whether or not they also have obtained an advanced degree. SIPP collects the dates of baccalaureate completion for both bachelor's and advanced degree holders. Readers should note that duration times estimated refer to real calendar time, not necessarily the amount of time spent in the enrolled status. Since the data are based on a cross-section, censored observations (i.e., persons who have begun a degree but have not yet finished it) are excluded from the estimates.

Overall, only 43.2 percent of all adults with a bachelor's completed their degree within 4 years of high school graduation. However, 3 out of 4 persons finished their degree in 6 years or less. The average time taken to complete a bachelor's degree is 6.21 years after high school completion. Readers should note that this average reflects not only the large proportion of people who complete their college education in a relatively short number of calendar years, but a significant minority of people who may not obtain their bachelor's degree until substantially later in life. These very large duration times (in calendar years) act to inflate the overall mean time.

Across demographic subgroups, there is some variation in the proportions receiving their bachelor's degree within 4 years. Although the sexes do not differ significantly in the average amount of time spent achieving

Table B. Average Monthly Earnings by Bachelor's Degree Holders, by Field: Spring 1987 (Adjusted) and Spring 1990

Field of degree	1990 earnings		1987 earnings		
	Mean	Standard error	Original mean	Adjusted mean ¹	Adjusted standard error
BACHELOR'S DEGREES					
Total	\$2,116	\$41	\$1,829	\$2,103	\$44
Agriculture/Forestry	2,537	708	2,154	2,477	297
Biology	2,409	308	1,640	1,886	169
Business/Management	² 2,447	92	2,330	2,680	103
Economics	2,528	395	2,756	3,169	446
Education	1,532	97	1,181	1,358	73
Engineering	2,953	135	2,670	3,070	125
English/Journalism	1,607	145	1,431	1,646	171
Home Economics	906	156	1,079	1,241	144
Liberal Arts/Humanities	1,592	101	1,346	1,548	97
Mathematics/Statistics	2,569	228	2,548	2,930	341
Nursing/Pharmacy/Technical Health	² 1,898	101	1,367	1,572	100
Physical/Earth Sciences	² 2,399	211	1,467	1,687	153
Psychology	2,021	186	2,067	2,377	287
Social Sciences	1,841	150	1,674	1,925	129
Other	² 2,369	163	1,617	1,860	153

¹1987 dollars adjusted to 1990 using an inflation factor of 1.15 derived from Consumer Price Index (CPI-U-X1 series).

²Indicates 1990 amount is significantly different from 1987 amount.

this degree, the proportion of women obtaining a bachelor's within 4 years of high school completion is greater than that of men (49 percent vs. 38 percent). The same holds true when comparing the proportions completing the degree within 6 years of high school (79 percent vs. 70 percent). The differences between Whites and Blacks are substantial. The average time to completion of the bachelor's was nearly 1 year higher for Blacks than for Whites (7.01 compared to 6.18) and only about a third of Blacks finished within 4 years (32.7 percent) compared to 44.2 percent of Whites. Persons of Hispanic origin do not differ significantly from either race group in terms of average completion time (6.58 years). However, within the Hispanic population, there is a difference between the sexes. Hispanic women, on average, spent 7.21 years to complete their bachelor's while Hispanic men averaged 6.05 years.

One interesting question is whether the length of time to obtain a degree varies by the field in which it is attained. For example, degrees in natural sciences may take longer to complete than those in social sciences. The data clearly show that persons in the field of home economics have the highest proportion finishing within 4 years of high school at 67.4 percent; the average duration time to degree is just 4.7 years. On the other hand, the fields of nursing/pharmacy/technical health and engineering have some of the smallest proportions completing a bachelor's degree within 4 years of leaving high school at 29.2 and 30.1 percent respectively.

For persons with a degree beyond the Baccalaureate, only the field of the highest degree is known. Table 5 shows that among people with an advanced degree the time to obtain the bachelor's was fairly short (5.71 years); 78 percent complete their bachelor's within 6 years of finishing high school.

Graduate degree programs often measure their success rates by the speed in which students finish their programs. Because SIPP is a sample survey, there are not enough observations to provide statistically reliable estimates for each degree. Table C gives the average time to completion for advanced degrees for the total population and by gender. Each duration is measured from the completion of the bachelor's to the completion of the advanced degree and reflects real calendar time rather than the actual amount of time the person is

enrolled. Censored observations are again excluded from the duration estimate since the data are based on a cross-section. On average, a doctorate took the longest to complete (8.97 years), followed by a master's (6.47 years), with a professional degree taking the shortest amount of time (5.07 years). The gender differences in completion times depend on the degree attained. Women take a substantially longer time to finish doctorate and master's programs than do men; however, the two sexes have comparable durations in achieving professional degrees.

DEGREES, FIELDS, AND OCCUPATIONS

Individuals choose a field of study in college with at least some anticipation of the kind of job that is desired after graduation. The relationship between one's field of training and the eventual field of employment is mediated by many other forces. Table 6 details the relationship between degrees, fields of training, and 15 occupational categories (including a category for those not working — not employed or not in the labor force) for the adult population between the ages of 18 and 64. Respondents were asked to provide information on employment during the 4-month period under observation. Information was collected about up to two employers for whom the respondent worked the most hours. For persons who were self-employed, additional information was collected for up to two self-employment businesses which produced the highest gross earnings. In table 6, the primary occupation of each individual was assigned to the job with the most hours.

The data indicate an association between the proportion of respondents in a given occupation and the highest degree held. Table D summarizes the detail of table 6 using level of the highest degree only. The majority of advanced degree holders held either an executive, administrative, or managerial position (20.1 percent), or a professional specialty occupation (57.3 percent). Only 8.5 percent of this group were not working. As figure 3 shows, holders of bachelor's degrees also had sizable proportions in executive, administrative, or managerial positions and professional specialty occupations (50.1 percent combined), but were less concentrated in these areas than those with advanced

Table C. Average Time Spent Earning Advanced Degrees by Gender: Spring 1990

(Numbers in thousands)

	Years from end of Bachelor's to:								
	Doctorate			Professional			Master's		
	Total	Mean	Standard error	Total	Mean	Standard error	Total	Mean	Standard error
Both sexes	1056	8.97	0.49	2054	5.07	0.32	7599	6.47	0.19
Male	833	8.36	0.54	1547	5.23	0.36	3996	5.78	0.23
Female	223	11.24	1.09	506	4.61	0.67	3603	7.24	0.30

Figure 3.
**Occupational Distribution of Advanced and
 Bachelor's Degree Holders: Spring 1990**

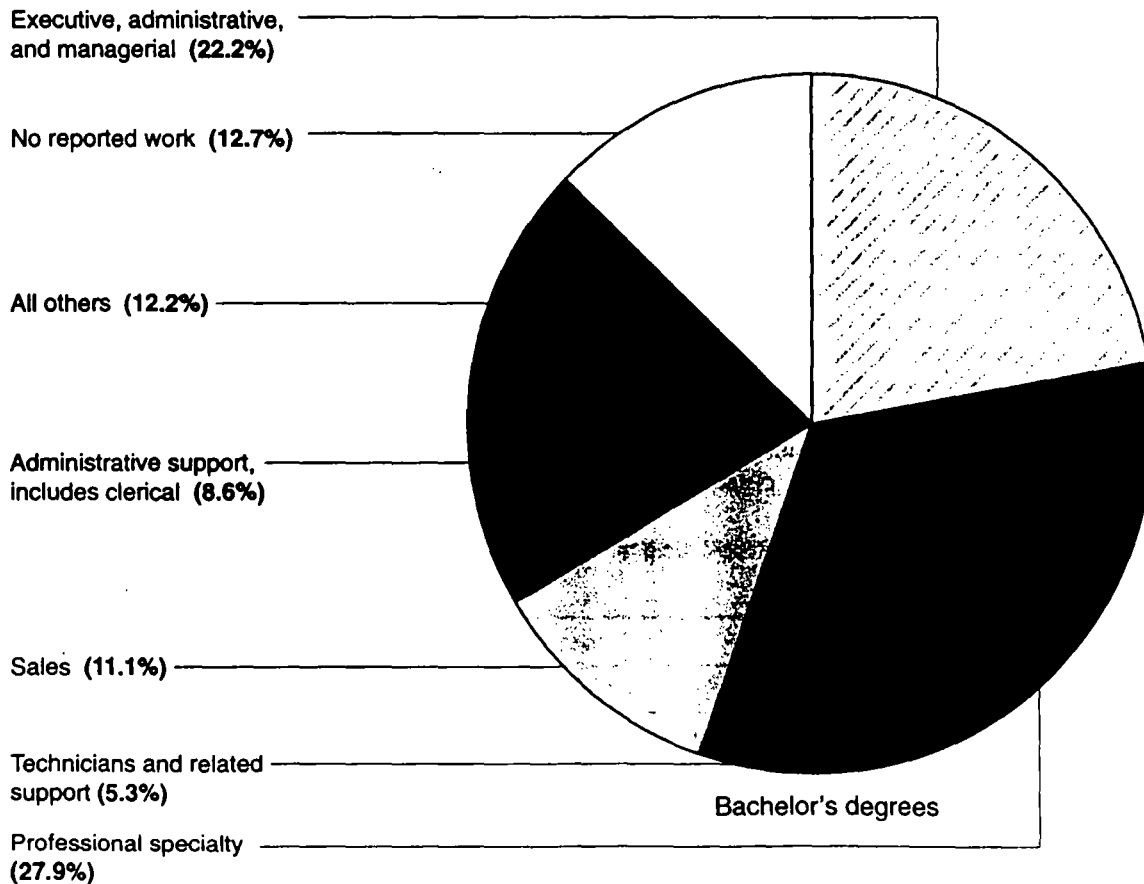
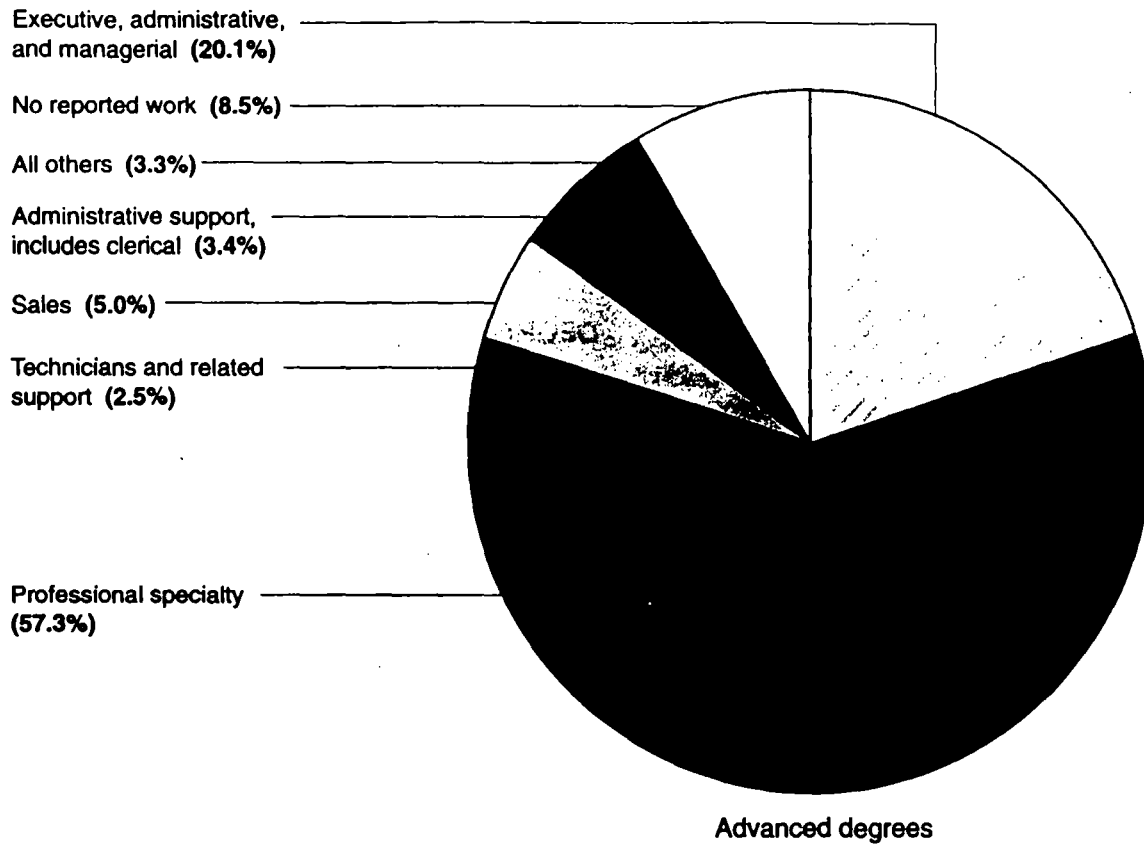


Table D. Percentage in Primary Occupation by Degree for Persons 18 to 64: Spring 1990

(Numbers in thousands)

Occupations	Total	Advanced	Bachelor's	Associate or vocational	High school graduate only	Not a high school graduate
TOTAL.....	152,815	9,584	20,690	11,413	85,653	25,474
Executive, administrative, and managerial.....	9.7	20.1	22.2	10.9	7.6	2.2
Professional specialty.....	10.3	57.3	27.9	12.7	3.4	0.4
Technicians and related support.....	2.7	2.5	5.3	7.3	2.2	0.4
Sales.....	8.7	5.0	11.1	9.1	8.7	4.5
Administrative support, includes clerical.....	12.3	3.4	8.6	17.2	16.2	3.5
Private household service.....	0.4	0.1	0.1	0.4	0.4	0.7
Protective service.....	1.4	0.4	1.2	2.1	1.6	0.6
Other service.....	8.5	0.9	3.3	8.5	9.8	11.2
Precision production, craft, and repair.....	8.0	0.6	3.3	9.4	10.9	10.3
Machine operators, assemblers, and inspectors.....	5.4	0.3	1.1	2.8	6.1	9.5
Transportation and material moving.....	3.5	0.1	0.9	1.9	4.2	5.1
Handlers, equipment cleaners, and laborers.....	3.4	0.1	0.7	1.5	3.9	5.8
Farming, forestry, and fishing.....	2.1	0.1	0.8	1.0	2.2	3.9
Armed forces.....	0.7	0.6	0.9	0.6	0.9	0.0
No reported work —(includes not in the labor force).....	22.0	8.5	12.7	14.6	20.9	41.8

degrees. Those with the baccalaureate had higher proportions in other jobs such as sales (11.1 percent) and administrative support (8.6 percent). The highest concentration of associate and vocational degree holders (17.2 percent) was found in the area of administrative support which includes clerical work. A similar proportion of persons with a high school diploma was also found in this occupational area (16.2 percent).

The proportion of persons in executive, administrative, and managerial and professional specialty occupations significantly decreased with decreasing levels of education. Just 11.1 percent of persons with a high school diploma and only 2.6 percent of those who had not graduated high school held jobs in these areas compared to 23.6 percent of those with an associate or vocational degree, one half of bachelor's degree holders, and 77.4 percent of persons with an advanced degree. There is also a relationship between educational level and the proportion of persons not working, ranging from a low of 8.5 percent for advanced degree holders to a high of 41.8 percent for non-high school graduates. This pattern in the not working category by degree generally holds true for both men and women; however, the proportion not working is higher for women than for men at each degree level.

There were gender differences in occupational distributions at the baccalaureate and advanced degree levels. Among advanced degree holders, men and women had similar proportions employed in professional specialty occupations (55.8 vs. 59.5 percent). However, a much larger proportion of men than women held executive, administrative, or managerial positions (23.7 vs. 14.9 percent).

At the bachelor's level, a much larger proportion of women than men held professional specialty jobs (33.8

vs. 22.4). However, with respect to executive, administrative, and managerial positions, men held proportionately more of these jobs than women, just as for advanced degree holders. Additionally, while twice as many men than women with bachelor's degrees were in sales (14.3 vs. 7.6 percent), the pattern was the reverse for administrative support (11.2 percent of female bachelor's vs. 6.1 percent of males).

There were also strong gender differences at lower degree levels. Even though a large proportion of persons with an associate or vocational degree held a job in administrative support (17.2 percent), only 7.4 percent of these men held such a job compared to one quarter of women. On the other hand, 1 in 5 men at this degree level were in a job involving precision production, craft, and repair; only 1.2 percent of women had this kind of job.

Within each degree type, there are certain fields of study that are highly concentrated in a given occupation. For example, while only 11.1 percent of all bachelor's degree holders had a sales occupation, nearly 1 in 5 persons with a degree in economics (19.4 percent) and 19.1 percent in business and management had jobs in sales.

Even though the majority of advanced degree holders were employed in one of two occupational categories (executive/administrative or professional specialty), there were variations between fields in the concentration for a particular type of occupation. The majority of those with degrees in "specialty" fields such as law and medicine were employed in a professional specialty. Those who studied business and management as an advanced degree were highly concentrated in executive, administrative, and managerial occupations (52.0

percent). While only 5 percent of advanced degree holders were in sales jobs, the fields of English/journalism and business/management had a higher concentration in the sales area (17.6 and 12.6 percent respectively).

Within field, the type of job also varies across degrees. The same field at different educational levels would be expected to require different skills and involve different levels of coursework. It follows that the variations in learned skills would result in eligibility for different job types. The data show that persons with a degree in business/management had a heavier concentration than average in executive, administrative, and managerial positions; however, the proportion decreases from one-half of the advanced degree holders in this field to 18.7 percent of those with an associate or vocational degree.

At the associate/vocational level, the largest proportion of persons with business and management degrees had jobs in administrative support (includes clerical work). The reduction in executive and administrative positions with decreased education is evident across gender; however, men did not contribute as much as women to the larger proportion of associate or vocational degree recipients in administrative support staff. Only 14.5 percent of male business/management majors with an associate or vocational degree held jobs in this area compared to 40.1 percent of women.

Persons with degrees in the fields of education and nursing/pharmacy/technical health had higher concentrations than average in professional specialties. This may not be surprising since the fields themselves are specialized and would lead to specialized occupations such as teacher and nurse. However, the proportion in professional specialties shrinks noticeably from advanced degrees to associate and vocational degrees (for example, a drop of 63.3 percent to 19.0 percent in the field of education). At both the advanced and bachelor's degree levels in the field of education, men were more likely than women to have held an executive or administrative position.

The data demonstrate the great variability that occurs in the match of fields of training, the level of the training, and the jobs people ultimately hold. While a large proportion of persons with a particular degree may be found in mainly one or two occupations, within degrees and between each level of degree the proportion of persons in different occupations varies by field.

WORK-RELATED TRAINING

In addition to the education and training individuals receive in pursuit of traditional degrees, learning also goes on in other contexts. One of the more organized forms is the learning individuals experience as part of their job or in preparation for one. Some training is provided by government-sponsored programs or by

courses offered in the workplace. Training may also be offered in a less formal context such as on-the-job seminars, short-term refresher courses, or computer-assisted instruction. All persons under 65 years old were asked in the SIPP if they had "ever received training designed to help find a job, improve job skills, or learn a new job." For those individuals responding affirmatively, additional questions were asked about the location and nature of the most recent training. These data are presented in table 7.

About 1 in 4 adults between the ages of 18 and 64 reported that they had received work related training at some time.² Blacks were slightly less likely than Whites to have received training (23.7 vs. 26.2 percent), and persons of Hispanic origin (17.8 percent) were less likely than either race group to have received training.

Those persons with less than 9 years of education were much less likely to have received training than those with 9 or more years of schooling (10.8 vs. 26.7 percent).

A large proportion of those persons who had received work training said they used this training on their current job (67.7 percent). Use of training in the current job was most common for persons with more than 12 years of education (75.0 percent). The high rates of both training and use of training for the highest education group might at first appear to be counter-intuitive, since work training is often perceived as being aimed at groups "in need," i.e., the less well-educated, unemployed. The questions in SIPP, however, ask about any work-related training, which would include the very general types of training that people receive in the course of beginning and learning about a new job. About 34.0 percent of all respondents who received training said that it was obtained at work. In this regard, it is not unreasonable that higher rates of training are reported by those persons with higher levels of education and greater likelihood of being employed. A larger proportion of the highest educational group reported receiving training at work than did the lowest (40.3 percent vs. 25.7 percent). On the other hand, of persons who received training, those who participated in government-sponsored training programs (e.g., Food Stamps Work Program) were more likely to be the less well-educated (19.6 percent of persons with fewer than 9 years of school as opposed to just 8.0 percent for those with more than 12 years of school).

While training was received in a wide variety of places, the workplace was the most frequently mentioned locale. (Respondents could report more than one location.) A large proportion (32 percent) of all persons with training said they had received it at some time since 1989. This finding should be viewed with some caution,

²The proportion of White persons receiving work training (26.2 percent) did not differ significantly from that of the total population (25.7 percent).

since the questions asked for the "most recent" training. In addition, the recall of training received even more than a few years ago may be difficult for many respondents, particularly if the training was short-term or of an informal nature. The average length of training programs was reported as about 22 weeks, but many programs (23 percent) lasted a week or less.

Payment for work-training programs generally came from the employer (45 percent). [Note: Respondents were asked to mark all sources of payment that apply.] Twenty-seven percent reported receiving funds from the government (federal, state, or local), and 29 percent reported training paid for by self or family. A larger proportion of men than women (50 vs. 41 percent) who

received training said their employer paid for it. On the other hand, women were more likely to pay for the program themselves or with the help of their family than were men (35 percent vs. 24 percent).

Federally-sponsored programs (i.e., JTPA, CETA, WIN, JOBS, Food Stamps Work Program, Veterans' Training Programs, and other programs sponsored by the Welfare Program or AFDC) accounted for about 11 percent of all persons' most recent training activity. In general, these data on work training provide a simple illustration of the magnitude and diversity of learning which goes on beyond "regular" education. While government-sponsored programs provide some of this training, many other forms also exist. ✓

Table 1. Highest Degree Earned, by Sex, Race, Hispanic Origin and Age: Spring 1990

(Numbers in thousands)

Age, sex, race	Total	Doc- torate	Profes- sional	Master's	Bache- lor's	Asso- ciate	Voca- tional	Some college, no degree	High school graduate only	Not a high school graduate
Total, 18 years and over	182,591	1,056	2,054	7,599	22,845	7,570	4,973	33,191	65,291	38,012
Male	87,240	833	1,547	3,996	11,769	3,600	1,737	16,099	29,713	17,948
Female	95,350	223	506	3,603	11,076	3,970	3,236	17,092	35,578	20,065
White	156,385	956	1,898	6,813	20,381	6,677	4,541	28,608	56,240	30,270
Male	75,262	744	1,449	3,552	10,629	3,242	1,588	14,076	25,556	14,425
Female	81,123	212	449	3,261	9,752	3,435	2,953	14,532	30,684	15,845
Black	20,401	34	46	462	1,387	670	284	3,534	7,495	6,510
Male	9,158	28	38	199	581	257	87	1,441	3,483	3,045
Female	11,242	6	8	262	786	413	197	2,094	4,012	3,465
Hispanic origin ¹	13,548	32	55	245	734	316	208	1,933	4,091	5,934
Male	6,708	27	44	121	388	153	89	976	1,961	2,950
Female	6,841	5	11	124	346	163	119	958	2,130	2,984
Age										
18 to 24 years	25,145	-	22	50	1,725	770	451	8,357	8,877	4,892
25 to 34 years	43,245	118	509	1,508	7,522	2,670	1,215	8,277	16,034	5,392
35 to 44 years	37,708	292	648	2,859	6,415	2,383	1,213	6,910	12,655	4,332
45 to 54 years	25,489	329	295	1,599	3,132	931	753	3,718	9,937	4,796
55 to 64 years	21,228	156	310	888	1,896	497	530	2,573	8,315	6,063
65 years and over	29,776	160	270	694	2,156	319	811	3,356	9,473	12,537
PROPORTION										
Total, 18 years and over	1.000	0.006	0.011	0.042	0.125	0.041	0.027	0.182	0.358	0.208
Male	1.000	0.010	0.018	0.046	0.135	0.041	0.020	0.185	0.341	0.206
Female	1.000	0.002	0.005	0.038	0.116	0.042	0.034	0.179	0.373	0.210
White	1.000	0.006	0.012	0.044	0.130	0.043	0.029	0.183	0.360	0.194
Male	1.000	0.010	0.019	0.047	0.141	0.043	0.021	0.187	0.340	0.192
Female	1.000	0.003	0.006	0.040	0.120	0.042	0.036	0.179	0.378	0.195
Black	1.000	0.002	0.002	0.023	0.067	0.033	0.014	0.173	0.367	0.319
Male	1.000	0.003	0.004	0.022	0.063	0.028	0.009	0.157	0.380	0.332
Female	1.000	0.001	0.001	0.023	0.070	0.037	0.017	0.186	0.357	0.308
Hispanic Origin	1.000	0.002	0.004	0.018	0.054	0.023	0.015	0.143	0.302	0.438
Male	1.000	0.004	0.007	0.018	0.058	0.023	0.013	0.145	0.292	0.440
Female	1.000	0.001	0.002	0.018	0.051	0.024	0.017	0.140	0.311	0.436
Age										
18 to 24 years	1.000	0.000	0.001	0.002	0.069	0.031	0.018	0.332	0.353	0.195
25 to 34 years	1.000	0.003	0.012	0.035	0.174	0.062	0.028	0.191	0.371	0.125
35 to 44 years	1.000	0.006	0.017	0.076	0.170	0.063	0.032	0.183	0.336	0.115
45 to 54 years	1.000	0.013	0.012	0.063	0.123	0.037	0.030	0.146	0.390	0.188
55 to 64 years	1.000	0.007	0.015	0.042	0.089	0.023	0.025	0.121	0.392	0.286
65 years and over	1.000	0.005	0.009	0.023	0.072	0.011	0.027	0.113	0.318	0.421

- Represents zero.

¹Persons of Hispanic origin may be of any race.

Table 2. Four-Month Average Income, Earnings, Work Activity, and Educational Attainment, by Sex, Race, Hispanic Origin, and Age: Spring 1990

Educational attainment	Monthly income		Monthly earnings		Months with work activity	
	Mean	Standard error	Mean	Standard error	Mean	Standard error
TOTAL, 18 YEARS AND OVER						
Both sexes	\$1,599	\$16	\$1,284	\$15	2.60	0.01
Doctorate	4,545	340	3,855	304	3.45	0.11
Professional	5,554	457	4,961	455	3.37	0.09
Master's	3,211	203	2,822	202	3.34	0.05
Bachelor's	2,489	52	2,116	41	3.17	0.02
Associate	1,879	54	1,672	51	3.26	0.05
Vocational	1,568	58	1,237	50	2.83	0.06
Some college, no degree	1,545	33	1,280	31	2.88	0.02
High school graduate only	1,357	19	1,077	16	2.64	0.02
Not a high school graduate	856	12	492	12	1.58	0.02
Male	2,148	26	1,792	24	3.00	0.01
Doctorate	4,915	407	4,168	363	3.43	0.12
Professional	6,367	573	5,647	575	3.40	0.10
Master's	3,748	144	3,285	136	3.53	0.05
Bachelor's	3,235	91	2,763	66	3.48	0.04
Associate	2,380	95	2,185	95	3.54	0.06
Vocational	2,085	128	1,737	98	3.22	0.10
Some college, no degree	2,002	58	1,729	59	3.14	0.04
High school graduate only	1,853	36	1,542	30	3.09	0.02
Not a high school graduate	1,166	22	776	22	2.10	0.04
Female	1,096	18	819	17	2.24	0.01
Doctorate	3,162	501	2,683	450	3.52	0.21
Professional	3,070	471	2,866	455	3.29	0.19
Master's	2,614	388	2,309	388	3.14	0.07
Bachelor's	1,698	36	1,428	41	2.85	0.05
Associate	1,425	53	1,207	43	3.01	0.07
Vocational	1,290	54	968	52	2.62	0.09
Some college, no degree	1,115	32	857	20	2.63	0.04
High school graduate only	943	17	689	14	2.26	0.02
Not a high school graduate	579	11	239	8	1.11	0.02
WHITE, 18 YEARS AND OVER						
Both sexes	1,672	19	1,334	18	2.62	0.01
Doctorate	4,679	392	3,917	350	3.44	0.13
Professional	5,611	515	4,988	513	3.35	0.10
Master's	3,248	242	2,837	240	3.32	0.05
Bachelor's	2,552	60	2,149	47	3.17	0.03
Associate	1,920	64	1,703	61	3.27	0.05
Vocational	1,593	67	1,247	57	2.83	0.08
Some college, no degree	1,595	39	1,315	36	2.89	0.03
High school graduate only	1,405	21	1,102	17	2.65	0.03
Not a high school graduate	909	16	519	15	1.60	0.03
BLACK, 18 YEARS AND OVER						
Both sexes	1,070	27	894	28	2.38	0.02
Doctorate	(B)	(B)	(B)	(B)	(B)	(B)
Professional	(B)	(B)	(B)	(B)	(B)	(B)
Master's	2,786	246	2,613	260	3.50	0.14
Bachelor's	2,002	96	1,814	98	3.19	0.10
Associate	1,595	88	1,452	89	3.25	0.12
Vocational	1,170	105	1,003	112	2.75	0.22
Some college, no degree	1,204	82	1,064	79	2.81	0.06
High school graduate only	1,009	50	890	50	2.62	0.05
Not a high school graduate	652	16	388	18	1.49	0.05

Table 2. Four-Month Average Income, Earnings, Work Activity, and Educational Attainment, by Sex, Race, Hispanic Origin, and Age: Spring 1990—Continued

Educational attainment	Monthly income		Monthly earnings		Months with work activity	
	Mean	Standard error	Mean	Standard error	Mean	Standard error
HISPANIC, 18 YEARS AND OVER¹						
Both sexes	1,078	19	958	19	2.60	0.04
Doctorate	(B)	(B)	(B)	(B)	(B)	(B)
Professional	(B)	(B)	(B)	(B)	(B)	(B)
Master's	2,840	468	2,761	466	3.25	0.22
Bachelor's	1,895	127	1,841	124	3.45	0.10
Associate	1,549	127	1,569	132	3.34	0.16
Vocational	1,314	149	1,149	116	2.89	0.21
Some college, no degree	1,298	49	1,168	47	3.05	0.07
High school graduate only	1,092	29	974	30	2.76	0.05
Not a high school graduate	760	20	625	21	2.14	0.05
TOTAL, 18 TO 24 YEARS OLD						
Both sexes	724	11	707	11	2.73	0.02
Doctorate	(B)	(B)	(B)	(B)	(B)	(B)
Professional	(B)	(B)	(B)	(B)	(B)	(B)
Master's	(B)	(B)	(B)	(B)	(B)	(B)
Bachelor's	1,154	58	1,133	55	3.08	0.10
Associate	951	60	947	60	3.27	0.12
Vocational	892	81	875	82	3.41	0.17
Some college, no degree	698	19	678	17	2.84	0.05
High school graduate only	778	19	765	19	2.88	0.05
Not a high school graduate	461	18	441	19	2.02	0.06
TOTAL, 25 TO 34 YEARS OLD						
Both sexes	1,546	23	1,487	23	3.22	0.02
Doctorate	(B)	(B)	(B)	(B)	(B)	(B)
Professional	3,310	343	3,266	341	3.64	0.15
Master's	2,478	129	2,441	125	3.48	0.09
Bachelor's	2,154	48	2,105	47	3.55	0.04
Associate	1,639	63	1,570	58	3.47	0.06
Vocational	1,392	74	1,347	77	3.38	0.11
Some college, no degree	1,529	71	1,472	70	3.28	0.04
High school graduate only	1,340	35	1,282	35	3.19	0.04
Not a high school graduate	859	27	774	29	2.47	0.06
TOTAL, 35 TO 44 YEARS OLD						
Both sexes	2,056	49	1,931	47	3.32	0.02
Doctorate	4,917	865	4,650	781	3.82	0.11
Professional	5,719	687	5,601	683	3.69	0.11
Master's	3,580	513	3,414	510	3.71	0.05
Bachelor's	2,634	88	2,449	72	3.51	0.04
Associate	2,265	136	2,112	126	3.53	0.07
Vocational	1,784	93	1,695	91	3.55	0.09
Some college, no degree	2,028	73	1,898	71	3.37	0.05
High school graduate only	1,546	35	1,463	35	3.29	0.04
Not a high school graduate	947	33	842	35	2.53	0.07
TOTAL, 45 TO 54 YEARS						
Both sexes	2,148	49	1,947	44	3.19	0.02
Doctorate	4,625	366	4,402	372	3.88	0.11
Professional	7,597	1,612	7,173	1,611	3.79	0.14
Master's	3,512	203	3,316	176	3.73	0.06
Bachelor's	3,510	170	3,218	146	3.63	0.05
Associate	2,357	144	2,052	144	3.34	0.12
Vocational	1,781	170	1,683	173	3.23	0.15
Some college, no degree	2,140	96	1,987	140	3.39	0.06
High school graduate only	1,790	78	1,567	51	3.17	0.04
Not a high school graduate	1,064	52	949	52	2.48	0.06

Table 2. Four-Month Average Income, Earnings, Work Activity, and Educational Attainment, by Sex, Race, Hispanic Origin, and Age: Spring 1990—Continued

Educational attainment	Monthly income		Monthly earnings		Months with work activity	
	Mean	Standard error	Mean	Standard error	Mean	Standard error
TOTAL, 55 TO 64 YEARS						
Both sexes	1,725	53	1,173	47	2.15	0.04
Doctorate	(B)	(B)	(B)	(B)	(B)	(B)
Professional	8,320	1,944	7,335	1,934	3.41	0.25
Master's	3,421	334	2,557	320	3.09	0.15
Bachelor's	2,920	202	2,115	235	2.58	0.11
Associate	2,125	192	1,436	196	2.38	0.24
Vocational	1,877	192	1,295	196	2.36	0.25
Some college, no degree	2,046	214	1,258	97	2.50	0.10
High school graduate only	1,393	47	920	45	2.13	0.06
Not a high school graduate	951	33	564	34	1.63	0.06
TOTAL, 65 YEARS AND OVER						
Both sexes	1,275	34	165	14	0.50	0.02
Doctorate	(B)	(B)	(B)	(B)	(B)	(B)
Professional	4,301	707	1,732	628	1.68	0.32
Master's	2,470	185	552	161	1.00	0.19
Bachelor's	2,439	325	351	72	0.79	0.10
Associate	1,469	147	251	93	0.72	0.22
Vocational	1,483	223	135	46	0.52	0.12
Some college, no degree	1,656	110	267	71	0.69	0.07
High school graduate only	1,191	50	130	17	0.50	0.04
Not a high school graduate	852	18	61	7	0.32	0.02

B Base is less than 200,000 persons

¹Persons of Hispanic origin may be of any race

Table 3. Highest Degree and Field of Degree, by Sex, Race, Hispanic Origin and Age for Persons With Post-Secondary Degrees: Spring 1990

(Numbers in thousands)

Field of degree	Total		Doctorate or professional	Master's	Bachelor's	Associate	Vocational
	Number	Percent					
TOTAL 18 YEARS AND OVER							
Both sexes	46,096	100	3,110	7,599	22,845	7,570	4,973
Agriculture/Forestry	545	1	10	88	273	139	35
Biology	898	2	42	144	670	41	-
Business/Management	8,830	19	54	1,263	4,871	1,841	801
Economics	710	2	16	89	587	19	-
Education	6,402	14	104	2,319	3,456	341	183
Engineering	3,944	9	88	554	2,449	721	132
English/Journalism	1,434	3	26	223	1,121	65	-
Home Economics	443	1	5	58	322	45	13
Law	1,104	2	897	34	73	76	24
Liberal Arts/Humanities	4,016	9	99	582	2,321	884	130
Mathematics/Statistics	860	2	37	177	485	135	27
Medicine/Dentistry	1,174	3	847	58	140	76	52
Nursing/Pharmacy/Technical Health	4,093	9	225	310	1,379	1,006	1,173
Physical/Earth Sciences	1,017	2	118	210	529	142	18
Police Science/Law Enforcement	476	1	17	25	196	175	63
Psychology	1,186	3	112	291	700	75	8
Religion/Theology	536	1	115	221	153	21	26
Social Sciences	2,161	5	102	417	1,441	160	41
Vo-technical Studies	3,014	7	3	36	141	873	1,961
Other	3,252	7	192	501	1,539	734	286
Male	23,481	100	2,380	3,996	11,769	3,600	1,737
Agriculture/Forestry	479	2	10	78	251	108	31
Biology	528	2	39	96	371	23	-
Business/Management	5,425	23	51	961	3,301	873	240
Economics	485	2	16	73	378	18	-
Education	1,735	7	61	823	749	73	29
Engineering	3,493	15	80	506	2,235	582	89
English/Journalism	383	2	24	62	274	24	-
Home Economics	20	-	5	-	3	12	-
Law	835	4	720	19	58	34	4
Liberal Arts/Humanities	1,620	7	62	255	857	379	66
Mathematics/Statistics	564	2	37	99	331	83	14
Medicine/Dentistry	767	3	684	16	52	16	-
Nursing/Pharmacy/Technical Health	456	2	66	65	222	59	43
Physical/Earth Sciences	735	3	118	142	371	93	11
Police Science/Law Enforcement	376	2	17	21	145	141	52
Psychology	474	2	41	138	279	16	-
Religion/Theology	441	2	111	179	123	18	10
Social Sciences	1,138	5	80	203	751	81	23
Vo-technical Studies	1,775	8	-	27	130	618	999
Other	1,752	7	158	232	887	349	126
Female	22,615	100	729	3,603	11,076	3,970	3,236
Agriculture/Forestry	66	-	-	10	22	30	4
Biology	369	2	4	48	299	18	-
Business/Management	3,405	15	4	302	1,570	969	561
Economics	226	1	-	15	209	1	-
Education	4,667	21	43	1,496	2,707	267	154
Engineering	451	2	7	48	214	140	43
English/Journalism	1,051	5	2	160	847	41	-
Home Economics	423	2	-	58	319	33	13
Law	269	1	177	15	15	42	20
Liberal Arts/Humanities	2,396	11	36	328	1,464	504	63
Mathematics/Statistics	297	1	-	78	154	53	13
Medicine/Dentistry	407	2	164	42	88	61	52
Nursing/Pharmacy/Technical Health	3,638	16	159	244	1,157	947	1,130
Physical/Earth Sciences	281	1	-	68	157	49	7
Police Science/Law Enforcement	100	-	-	4	51	34	11
Psychology	712	3	71	153	421	59	8
Religion/Theology	95	-	4	41	30	4	16
Social Sciences	1,022	5	22	214	690	78	18
Vo-technical Studies	1,239	5	3	9	10	254	962
Other	1,501	7	34	270	652	385	160

Table 3. Highest Degree and Field of Degree, by Sex, Race, Hispanic Origin and Age for Persons With Post-Secondary Degrees: Spring 1990—Continued

(Numbers in thousands)

Field of degree	Total		Doctorate or professional	Master's	Bachelor's	Associate	Vocational
	Number	Percent					
WHITE, 18 YEARS AND OVER							
Both sexes	41,267	100	2,855	6,813	20,381	6,677	4,541
Agriculture/Forestry	521	1	7	78	266	135	35
Biology	808	2	31	128	608	41	-
Business/Management	7,869	19	47	1,140	4,344	1,610	727
Economics	599	1	16	84	481	18	-
Education	5,756	14	93	2,101	3,102	294	168
Engineering	3,364	8	81	392	2,162	614	115
English/Journalism	1,367	3	26	219	1,061	61	-
Home Economics	397	1	5	51	294	37	10
Law	1,036	3	866	30	52	69	20
Liberal Arts/Humanities	3,616	9	99	526	2,078	808	104
Mathematics/Statistics	771	2	33	174	441	101	23
Medicine/Dentistry	996	2	739	46	108	50	52
Nursing/Pharmacy/Technical Health	3,673	9	210	280	1,227	881	1,075
Physical/Earth Sciences	926	2	108	187	486	126	18
Police Science/Law Enforcement	427	1	17	23	161	169	56
Psychology	1,065	3	112	271	618	60	4
Religion/Theology	496	1	104	204	144	21	22
Social Sciences	1,943	5	80	402	1,287	132	41
Vo-tech Studies	2,758	7	3	28	124	789	1,813
Other	2,881	7	177	450	1,336	661	258
BLACK, 18 YEARS AND OVER							
Both sexes	2,862	100	79	462	1,367	670	284
Agriculture/Forestry	9	-	-	6	-	4	-
Biology	33	1	-	13	21	-	-
Business/Management	589	21	6	47	315	168	52
Economics	41	1	-	-	40	1	-
Education	516	18	11	183	284	32	5
Engineering	254	9	-	40	114	87	12
English/Journalism	43	2	-	-	40	3	-
Home Economics	21	1	-	7	7	4	3
Law	23	1	12	-	3	7	-
Liberal Arts/Humanities	223	8	-	38	122	56	6
Mathematics/Statistics	48	2	-	3	10	31	4
Medicine/Dentistry	50	2	24	6	6	14	-
Nursing/Pharmacy/Technical Health	248	9	3	23	57	98	68
Physical/Earth Sciences	51	2	7	14	14	16	-
Police Science/Law Enforcement	37	1	-	2	23	6	6
Psychology	86	3	-	15	65	7	-
Religion/Theology	28	1	11	9	4	-	4
Social Sciences	149	5	-	11	114	24	-
Vo-tech Studies	164	6	-	6	13	51	94
Other	249	9	6	40	116	59	28
HISPANIC, 18 YEARS AND OVER ¹							
Both sexes	1,590	100	86	245	734	316	208
Agriculture/Forestry	16	1	-	-	12	4	-
Biology	13	1	-	-	10	2	-
Business/Management	281	18	8	42	146	48	37
Economics	22	1	-	-	22	-	-
Education	278	17	4	108	133	27	6
Engineering	107	7	3	9	72	23	-
English/Journalism	12	1	-	-	10	2	-
Home Economics	13	1	-	-	6	7	-
Law	35	2	27	2	-	6	-
Liberal Arts/Humanities	191	12	-	31	114	41	5
Mathematics/Statistics	18	1	-	4	14	-	-
Medicine/Dentistry	40	3	21	7	7	5	-
Nursing/Pharmacy/Technical Health	120	8	2	7	43	30	37
Physical/Earth Sciences	21	1	7	4	7	-	3
Police Science/Law Enforcement	15	1	-	-	15	-	-
Psychology	45	3	6	9	23	6	-
Religion/Theology	13	1	3	4	6	-	-
Social Sciences	57	4	-	3	39	9	6
Vo-tech Studies	182	11	-	-	12	75	94
Other	112	7	6	15	43	30	19

Table 3. Highest Degree and Field of Degree, by Sex, Race, Hispanic Origin and Age for Persons With Post-Secondary Degrees: Spring 1990—Continued

(Numbers in thousands)

Field of degree	Total		Doctorate or professional	Master's	Bachelor's	Associate	Vocational
	Number	Percent					
TOTAL, 18 TO 24 YEARS							
Both sexes	3,018	100	22	50	1,725	770	451
Agriculture/Forestry	18	1	-	-	9	9	-
Biology	93	3	-	-	89	4	-
Business/Management	620	21	-	10	374	178	58
Economics	79	3	-	-	76	3	-
Education	237	8	-	9	211	17	-
Engineering	233	8	-	4	155	62	13
English/Journalism	59	2	-	8	50	-	-
Home Economics	11	-	-	-	3	9	-
Law	26	1	5	-	9	9	3
Liberal Arts/Humanities	296	10	-	6	158	123	8
Mathematics/Statistics	84	3	-	-	72	8	4
Medicine/Dentistry	44	1	5	-	39	-	-
Nursing/Pharmacy/Technical Health	286	9	12	-	99	66	109
Physical/Earth Sciences	48	2	-	4	29	15	-
Police Science/Law Enforcement	47	2	-	-	9	32	6
Psychology	53	2	-	-	45	8	-
Religion/Theology	14	-	-	-	14	-	-
Social Sciences	138	5	-	-	121	14	4
Vo-tech Studies	336	11	-	-	12	98	226
Other	295	10	-	8	151	116	20
TOTAL, 25 TO 34 YEARS							
Both sexes	13,542	100	627	1,508	7,522	2,670	1,215
Agriculture/Forestry	192	1	-	12	78	97	4
Biology	244	2	14	38	181	11	-
Business/Management	2,897	21	7	332	1,809	611	137
Economics	214	2	-	18	188	8	-
Education	1,034	8	-	213	730	82	8
Engineering	1,428	11	24	172	908	287	38
English/Journalism	387	3	-	41	326	21	-
Home Economics	97	1	-	7	68	21	-
Law	293	2	234	11	15	29	4
Liberal Arts/Humanities	1,239	9	15	148	775	283	17
Mathematics/Statistics	199	1	8	24	139	23	4
Medicine/Dentistry	363	3	240	27	61	20	15
Nursing/Pharmacy/Technical Health	1,283	9	26	77	558	338	284
Physical/Earth Sciences	299	2	11	25	203	55	5
Police Science/Law Enforcement	131	1	-	-	53	55	24
Psychology	392	3	6	88	262	35	-
Religion/Theology	85	1	4	49	32	-	-
Social Sciences	596	4	17	71	439	70	-
Vo-tech Studies	982	7	-	4	65	348	566
Other	1,188	9	20	152	631	277	108
TOTAL, 35 TO 44 YEARS							
Both sexes	13,811	100	941	2,859	6,415	2,383	1,213
Agriculture/Forestry	95	1	-	19	44	21	11
Biology	332	2	15	70	220	27	-
Business/Management	2,403	17	17	469	1,211	528	178
Economics	114	1	8	21	85	-	-
Education	2,257	16	19	892	1,214	123	8
Engineering	963	7	13	180	509	217	43
English/Journalism	447	3	5	78	351	13	-
Home Economics	95	1	5	13	67	4	5
Law	353	3	294	6	20	21	12
Liberal Arts/Humanities	1,343	10	36	241	744	303	18
Mathematics/Statistics	258	2	3	51	119	81	4
Medicine/Dentistry	369	3	274	14	21	47	12
Nursing/Pharmacy/Technical Health	1,325	10	84	165	353	390	333
Physical/Earth Sciences	334	2	34	76	173	46	5
Police Science/Law Enforcement	164	1	-	14	80	58	12
Psychology	381	3	37	77	244	15	8
Religion/Theology	175	1	28	93	44	5	5
Social Sciences	724	5	19	173	474	52	5
Vo-tech Studies	754	5	3	4	20	241	485
Other	927	7	46	203	418	192	68

Table 3. Highest Degree and Field of Degree, by Sex, Race, Hispanic Origin and Age for Persons With Post-Secondary Degrees: Spring 1990—Continued

(Numbers in thousands)

Field of degree	Total		Doctorate or professional	Master's	Bachelor's	Associate	Vocational
	Number	Percent					
TOTAL, 45 TO 54 YEARS							
Both sexes	7,038	100	624	1,599	3,132	931	753
Agriculture/Forestry	82	1	-	21	58	5	-
Biology	118	2	13	20	85	-	-
Business/Management	1,435	20	16	274	715	326	103
Economics	132	2	-	40	87	4	-
Education	1,180	17	30	567	526	31	26
Engineering	563	8	25	108	333	86	10
English/Journalism	186	3	11	39	131	4	-
Home Economics	68	1	-	12	48	4	3
Law	204	3	158	13	20	13	-
Liberal Arts/Humanities	506	7	23	98	275	94	17
Mathematics/Statistics	184	3	4	65	91	13	10
Medicine/Dentistry	131	2	82	17	5	7	20
Nursing/Pharmacy/Technical Health	567	8	59	16	174	129	189
Physical/Earth Sciences	158	2	42	37	68	12	-
Police Science/Law Enforcement	57	1	5	11	21	16	4
Psychology	189	3	43	45	84	17	-
Religion/Theology	91	1	17	38	17	9	9
Social Sciences	311	4	26	93	181	3	8
Vo-tech Studies	441	6	-	7	30	92	312
Other	437	6	67	78	184	66	42
TOTAL, 55 TO 64 YEARS							
Both sexes	4,277	100	465	888	1,896	497	530
Agriculture/Forestry	55	1	-	9	19	7	20
Biology	68	2	-	7	60	-	-
Business/Management	751	18	10	87	403	132	119
Economics	84	2	-	-	84	-	-
Education	737	17	19	343	340	24	12
Engineering	408	10	21	54	265	54	15
English/Journalism	146	3	6	28	90	22	-
Home Economics	87	2	-	10	66	7	5
Law	132	3	115	4	4	5	5
Liberal Arts/Humanities	278	6	8	50	144	51	26
Mathematics/Statistics	95	2	17	27	40	11	-
Medicine/Dentistry	108	3	99	-	5	-	4
Nursing/Pharmacy/Technical Health	306	7	25	31	100	47	102
Physical/Earth Sciences	97	2	23	41	18	11	4
Police Science/Law Enforcement	60	1	-	-	33	11	16
Psychology	113	3	26	60	27	-	-
Religion/Theology	109	3	39	37	27	-	6
Social Sciences	202	5	32	52	94	13	10
Vo-tech Studies	244	6	-	22	4	59	159
Other	193	5	25	25	74	41	28
TOTAL, 65 YEARS AND OVER							
Both sexes	4,410	100	431	694	2,156	319	811
Agriculture/Forestry	103	2	10	25	68	-	-
Biology	43	1	-	9	34	-	-
Business/Management	725	16	4	91	359	65	207
Economics	87	2	8	9	66	4	-
Education	957	22	36	295	435	64	128
Engineering	349	8	4	38	279	14	14
English/Journalism	209	5	4	28	172	4	-
Home Economics	85	2	-	15	70	-	-
Law	96	2	91	-	5	-	-
Liberal Arts/Humanities	355	8	18	39	225	29	44
Mathematics/Statistics	41	1	4	9	23	-	5
Medicine/Dentistry	159	4	147	-	10	3	-
Nursing/Pharmacy/Technical Health	327	7	18	21	95	36	157
Physical/Earth Sciences	80	2	8	27	38	3	3
Police Science/Law Enforcement	18	-	12	-	-	4	-
Psychology	58	1	-	21	37	-	-
Religion/Theology	61	1	25	4	18	8	6
Social Sciences	189	4	7	29	133	7	13
Vo-tech Studies	258	6	-	-	9	37	212
Other	211	5	34	34	81	42	20

- Represents zero.

¹Persons of Hispanic origin may be of any race.

Table 4. Average Monthly Income, Earnings, and Work Activity, by Level and Field of Degree: Spring 1990

Field of degree	Monthly income		Monthly earnings		Months with work activity	
	Mean	Standard error	Mean	Standard error	Mean	Standard error
ALL DEGREES¹						
Total	\$2,592	\$50	\$2,231	\$46	3.19	0.02
Agriculture/Forestry	3,062	527	2,480	529	3.34	0.20
Biology	2,667	257	2,435	248	3.29	0.14
Business/Management	2,728	74	2,361	68	3.31	0.04
Economics	3,017	348	2,545	348	2.91	0.16
Education	2,262	226	1,863	224	2.92	0.06
Engineering	3,299	123	2,858	102	3.39	0.06
English/Journalism	2,048	134	1,670	131	2.70	0.14
Home Economics	1,568	183	1,046	183	2.53	0.25
Law	5,511	632	4,983	618	3.48	0.10
Liberal Arts/Humanities	2,242	187	1,739	100	3.11	0.07
Mathematics/Statistics	2,846	172	2,591	179	3.37	0.14
Medicine/Dentistry	5,173	546	4,666	545	3.21	0.12
Nursing/Pharmacy/Technical Health	1,914	73	1,712	70	3.14	0.06
Physical/Earth Sciences	3,177	325	2,785	278	3.38	0.11
Police Science/Law Enforcement	2,725	308	2,331	295	3.34	0.19
Psychology	2,349	146	2,118	147	3.32	0.11
Religion/Theology	2,126	173	1,877	164	3.50	0.15
Social Sciences	2,310	128	1,879	118	3.22	0.09
Vo-tech Studies	1,779	73	1,572	75	3.20	0.07
Other	2,407	104	2,128	100	3.30	0.07
ADVANCED DEGREES						
Total	3,792	174	3,334	171	3.36	0.04
Agriculture/Forestry	(B)	(B)	(B)	(B)	(B)	(B)
Biology	(B)	(B)	(B)	(B)	(B)	(B)
Business/Management	4,302	257	3,802	224	3.64	0.07
Economics	(B)	(B)	(B)	(B)	(B)	(B)
Education	3,048	595	2,597	597	3.19	0.09
Engineering	4,049	265	3,780	261	3.74	0.10
English/Journalism	2,317	312	2,055	329	3.03	0.29
Home Economics	(B)	(B)	(B)	(B)	(B)	(B)
Law	6,189	752	5,608	737	3.54	0.11
Liberal Arts/Humanities	2,737	357	2,383	355	3.10	0.16
Mathematics/Statistics	2,952	310	2,953	397	3.29	0.27
Medicine/Dentistry	6,218	662	5,651	665	3.36	0.12
Nursing/Pharmacy/Technical Health	2,923	367	2,683	372	3.19	0.19
Physical/Earth Sciences	4,769	913	3,982	764	3.35	0.21
Police Science/Law Enforcement	(B)	(B)	(B)	(B)	(B)	(B)
Psychology	2,735	277	2,416	274	3.36	0.21
Religion/Theology	2,354	231	2,073	204	3.72	0.15
Social Sciences	3,136	300	2,617	228	3.47	0.16
Vo-tech Studies	(B)	(B)	(B)	(B)	(B)	(B)
Other	3,005	260	2,550	240	3.31	0.16
BACHELOR'S DEGREES						
Total	2,489	52	2,116	41	3.17	0.02
Agriculture/Forestry	3,273	702	2,537	708	3.04	0.32
Biology	2,627	320	2,409	308	3.16	0.16
Business/Management	2,780	98	2,447	92	3.40	0.05
Economics	2,977	395	2,528	395	2.94	0.17
Education	1,882	110	1,532	97	2.89	0.07
Engineering	3,508	173	2,953	135	3.33	0.07
English/Journalism	2,041	154	1,607	145	2.68	0.16
Home Economics	1,484	159	906	156	2.58	0.29
Law	(B)	(B)	(B)	(B)	(B)	(B)
Liberal Arts/Humanities	2,239	291	1,592	101	3.09	0.10
Mathematics/Statistics	2,947	241	2,569	228	3.32	0.17
Medicine/Dentistry	(B)	(B)	(B)	(B)	(B)	(B)
Nursing/Pharmacy/Technical Health	2,056	96	1,896	101	3.25	0.10
Physical/Earth Sciences	2,559	213	2,399	211	3.42	0.15
Police Science/Law Enforcement	(B)	(B)	(B)	(B)	(B)	(B)
Psychology	2,196	180	2,021	186	3.30	0.14
Religion/Theology	(B)	(B)	(B)	(B)	(B)	(B)
Social Sciences	2,118	150	1,841	150	3.12	0.11
Vo-tech Studies	(B)	(B)	(B)	(B)	(B)	(B)
Other	2,639	165	2,369	163	3.35	0.10

B Base is less than 200,000 persons

¹Includes associate degrees and vocational certificates, not shown separately.

Table 5. Time Spent Earning Bachelor's Degree in Years by Field of Degree, Sex, Race, Hispanic Origin and Age: Spring 1990

(Numbers in thousands)

Age, sex, race	Total	4 years or less		5 years or less	6 years or less	Mean duration from end of high school to Bachelor's	
		Number	Percent			Mean	Standard error
Both sexes	33,553	14,509	43.2	21,905	24,822	6.21	0.07
Male	18,145	6,893	38.0	10,914	12,710	6.23	0.08
Female	15,409	7,616	49.4	10,991	12,111	6.19	0.11
White	30,048	13,267	44.2	19,845	22,347	6.18	0.08
Male	16,374	6,297	38.5	9,920	11,509	6.20	0.09
Female	13,675	6,970	51.0	9,926	10,838	6.16	0.13
Black	1,908	623	32.7	1,052	1,266	7.01	0.28
Male	846	242	28.6	428	536	7.12	0.41
Female	1,062	382	36.0	624	731	6.92	0.39
Hispanic origin¹	1,065	395	37.1	610	733	6.58	0.31
Male	579	210	36.3	343	410	6.05	0.38
Female	487	184	37.8	267	323	7.21	0.49
Age							
18 to 24 years	1,797	1,046	58.2	1,573	1,751	4.19	0.07
25 to 34 years	9,657	4,173	43.2	6,820	7,963	5.14	0.05
35 to 44 years	10,215	4,659	45.6	6,785	7,543	6.06	0.10
45 to 54 years	5,355	2,088	39.0	3,063	3,450	7.25	0.20
55 to 64 years	3,250	1,240	38.2	1,723	1,993	7.92	0.32
65 years and over	3,280	1,303	39.7	1,940	2,121	7.55	0.35
Field of Bachelor's degree²							
Agriculture/Forestry	273	79	28.9	162	189	6.30	0.71
Biology	670	281	41.9	449	514	5.75	0.35
Business/Management	4,871	1,872	38.4	2,959	3,499	6.47	0.17
Economics	587	248	41.9	371	454	5.47	0.26
Education	3,456	1,628	47.1	2,335	2,609	6.55	0.25
Engineering	2,449	738	30.1	1,333	1,553	6.80	0.25
English/Journalism	1,121	538	48.0	831	923	5.79	0.42
Home Economics	322	217	67.4	266	282	4.73	0.28
Law	73	11	(B)	23	28	(B)	(B)
Liberal Arts/Humanities	2,321	964	41.5	1,416	1,675	6.38	0.26
Mathematics/Statistics	485	192	39.6	294	364	5.81	0.46
Medicine/Dentistry	140	52	(B)	103	126	(B)	(B)
Nursing/Pharmacy/Technical Health	1,379	403	29.2	759	888	7.65	0.45
Physical/Earth Sciences	529	203	38.4	352	387	5.84	0.37
Police Science/Law Enforcement	196	69	(B)	76	98	(B)	(B)
Psychology	700	247	35.3	409	505	6.39	0.47
Religion/Theology	153	58	(B)	82	90	(B)	(B)
Social Sciences	1,441	666	46.2	942	1,037	6.54	0.37
Vo-tech Studies	141	46	(B)	86	102	(B)	(B)
Other	1,539	595	38.7	984	1,120	6.14	0.30
Advanced Degree-unknown BA field	10,708	5,405	50.5	7,673	8,377	5.71	0.10

B Base is less than 200,000 persons.

¹Persons of Hispanic origin may be of any race.

²While dates of BA attainment are provided for all respondents regardless of degree, the field of study is asked only for the highest degree received.

Table 6. Primary Occupation by Degree and Field for Persons 18 to 64 Years: Spring 1990

(Numbers in thousands)

Degree, field	Primary occupation															
	Total	Executive, administrative	Professional specialty	Technicians and related support	Sales	Administrative support, includes clerical	Private household	Protective service	Service, except protective and household	Precision production, craft, and repair	Machine operators, assemblers, and inspectors	Transportation and material moving	Handlers, equipment cleaners, helpers, and laborers	Farming, forestry and fishing	Armed forces	No reported work
ALL PERSONS																
ALL DEGREES																
Total	152,815	14,873	15,752	4,192	13,308	18,815	580	2,086	12,941	13,804	8,210	5,292	5,153	3,146	1,045	33,618
Agriculture/Forestry	442	66	103	25	67	14	4	-	11	34	13	18	7	59	4	18
Biology	855	167	271	70	80	56	-	10	8	20	20	11	-	14	9	120
Business/Management	8,105	2,832	746	225	1,334	1,225	8	82	174	282	96	93	55	61	84	807
Economics	623	192	73	20	111	57	-	10	8	11	12	8	11	3	4	103
Education	5,445	725	2,844	81	299	305	7	33	158	60	28	36	19	27	4	820
Engineering	3,595	584	1,350	391	235	189	-	8	44	271	68	58	41	13	37	295
English/Journalism	1,225	260	372	16	123	99	-	-	33	10	10	-	10	16	14	263
Home Economics	358	40	103	-	31	49	-	-	32	12	-	4	-	-	-	86
Law	1,008	107	661	23	21	57	-	12	8	13	2	3	4	-	7	89
Liberal Arts/Humanities	3,661	513	1,064	136	388	426	3	34	189	137	112	41	46	15	18	540
Mathematics/Statistics	819	166	294	34	69	54	-	3	39	60	8	-	5	4	11	73
Medicine/Dentistry	1,015	50	676	73	10	23	-	-	36	4	6	4	4	5	-	124
Nursing/Pharmacy/Technical Health	3,767	277	1,714	421	140	235	26	15	322	30	33	14	5	10	5	522
Physical/Earth Sciences	937	153	298	152	59	54	-	19	49	31	4	15	3	3	5	92
Police Science/Law Enforcement	480	58	47	18	21	33	-	154	13	15	5	24	14	-	5	54
Psychology	1,128	207	435	54	81	136	-	6	42	19	4	4	-	6	11	122
Religion/Theology	474	75	290	8	19	20	-	10	4	19	-	-	7	4	-	18
Social Sciences	1,972	463	498	68	193	246	4	40	108	40	20	11	20	7	9	242
Vo-tech Studies	2,756	208	151	227	193	423	7	47	272	608	99	57	47	39	17	362
Other	3,041	629	713	120	340	347	5	51	184	141	38	18	22	13	64	358
No post-secondary degree—no field	111,128	7,101	3,048	2,030	9,494	14,755	517	1,553	11,206	11,969	8,210	5,292	4,832	2,849	738	28,511
ADVANCED DEGREES																
Total	9,584	1,925	5,489	237	479	325	9	42	90	58	31	11	11	8	55	814
Agriculture/Forestry	62	8	30	5	10	-	-	-	-	-	-	4	-	-	-	4
Biology	178	22	130	4	7	-	-	-	-	4	7	-	-	-	-	3
Business/Management	1,222	636	259	24	154	67	-	-	-	6	4	3	-	6	20	43
Economics	87	25	26	-	11	5	-	-	-	-	4	-	-	-	-	16
Education	2,082	370	1,325	20	71	55	5	5	16	3	-	4	-	2	4	214
Engineering	601	102	396	42	17	6	-	-	-	5	4	-	-	-	4	25
English/Journalism	216	44	88	4	38	10	-	-	-	-	-	-	-	-	-	31
Home Economics	47	10	17	-	-	-	-	-	4	5	-	-	-	-	-	11
Law	840	90	641	7	15	14	-	4	-	-	2	-	2	-	7	56
Liberal Arts/Humanities	625	59	327	17	48	60	-	-	4	4	9	-	4	-	-	93
Mathematics/Statistics	200	28	142	4	4	-	-	-	-	4	-	-	-	-	-	19
Medicine/Dentistry	759	37	638	16	3	-	-	-	15	-	-	-	-	-	-	50
Nursing/Pharmacy/Technical Health	496	88	272	26	16	8	-	-	18	-	-	-	-	-	4	65
Physical/Earth Sciences	293	44	160	27	8	21	-	-	-	4	-	-	-	-	-	29
Police Science/Law Enforcement	30	11	11	4	-	-	-	4	-	-	-	-	-	-	-	-
Psychology	382	63	226	4	9	26	-	-	-	2	-	-	-	-	8	42
Religion/Theology	307	50	214	-	16	13	-	10	-	-	-	-	-	-	-	4
Social Sciences	483	101	265	11	18	13	4	15	15	-	-	-	-	-	-	41
Vo-tech Studies	40	6	6	-	9	-	-	-	-	-	-	-	-	-	-	18
Other	625	132	316	23	24	26	-	4	17	21	-	-	4	-	8	49
BACHELOR'S																
Total	20,690	4,596	5,771	1,090	2,299	1,772	15	250	675	878	226	195	137	174	181	2,630
Agriculture/Forestry	206	24	54	4	30	4	-	-	5	23	8	5	-	30	4	14
Biology	636	124	141	66	72	47	-	6	8	16	13	11	-	14	9	110
Business/Management	4,512	1,753	359	143	860	481	-	38	91	188	34	59	31	36	30	410
Economics	521	162	47	20	101	44	-	10	8	9	7	8	11	3	4	86
Education	3,022	326	1,457	61	203	188	2	21	133	26	17	25	19	25	-	518
Engineering	2,169	386	845	234	170	73	-	-	38	138	32	45	8	13	28	159
English/Journalism	949	204	279	12	85	83	-	-	30	10	5	-	10	16	14	201
Home Economics	253	22	82	-	28	49	-	-	9	7	-	-	-	-	-	55
Law	68	9	11	8	2	19	-	-	-	6	-	2	-	-	-	12
Liberal Arts/Humanities	2,096	343	639	91	218	207	3	16	90	66	50	6	24	8	14	320
Mathematics/Statistics	462	121	152	27	43	41	-	3	-	19	-	-	-	-	11	44
Medicine/Dentistry	130	5	13	45	4	5	-	-	4	-	6	-	-	-	-	48
Nursing/Pharmacy/Technical Health	1,284	110	710	96	41	79	4	4	66	13	2	8	-	10	-	142
Physical/Earth Sciences	491	104	129	98	36	25	-	10	15	8	4	3	3	3	5	48
Police Science/Law Enforcement	196	18	23	15	12	18	-	78	-	-	5	-	-	-	-	27
Psychology	663	132	201	41	70	80	-	6	38	12	-	4	-	6	3	70
Religion/Theology	134	20	64	8	3	2	-	-	4	19	-	-	7	4	-	4

Table 6. Primary Occupation by Degree and Field for Persons 18 to 64 Years: Spring 1990—Continued

(Numbers in thousands)

Degree, field	Primary occupation															
	Total	Executive, administrative	Professional specialty	Technicians and related support	Sales	Administrative support, includes clerical	Private household	Protective service	Service, except protective and household	Precision production, craft, and repair	Machine operators, assemblers, and inspectors	Transportation and material moving	Handers, equipment cleaners, helpers, and laborers	Farming, forestry and fishing	Armed forces	No reported work
Social Sciences	1,309	343	216	53	138	188	-	25	70	36	20	6	16	2	9	184
Vo-tech Studies	132	12	26	20	5	13	-	2	-	32	-	-	5	-	7	9
Other	1,458	377	320	49	178	125	5	32	65	53	22	13	3	4	43	169
ASSOCIATE/VOCA-TIONAL																
Total	11,413	1,249	1,444	836	1,035	1,964	40	242	969	1,078	321	213	175	115	70	1,664
Agriculture/Forestry	174	34	19	15	26	10	4	-	6	11	5	8	7	29	-	-
Biology	41	21	-	-	-	9	-	4	-	-	-	-	-	-	-	8
Business/Management	2,371	443	127	59	320	678	8	44	83	89	58	31	24	19	34	354
Economics	15	4	-	-	-	9	-	-	-	2	-	-	-	-	-	-
Education	332	29	63	-	24	62	-	7	9	31	11	7	-	-	-	88
Engineering	825	96	109	115	48	120	-	8	6	128	32	14	33	-	5	111
English/Journalism	60	11	6	-	-	6	-	-	2	-	5	-	-	-	-	30
Home Economics	58	8	4	-	3	-	-	-	19	-	-	4	-	-	-	21
Law	100	8	9	7	4	24	-	8	8	7	-	1	2	-	-	20
Liberal Arts/Humanities	940	111	97	26	121	159	-	18	96	67	53	35	18	7	4	127
Mathematics/Statistics	157	17	-	4	22	13	-	-	39	36	8	-	5	4	-	11
Medicine/Dentistry	126	8	25	11	3	18	-	-	17	4	-	4	4	5	-	27
Nursing/Pharmacy/Technical Health	1,967	80	732	299	83	148	22	10	238	17	31	6	5	-	1	315
Physical/Earth Sciences	153	5	8	26	15	9	-	9	33	19	-	11	-	-	-	15
Police Science/Law Enforcement	234	28	13	-	9	15	-	72	13	15	-	24	14	-	5	27
Psychology	83	11	8	9	3	29	-	-	4	5	4	-	-	-	-	10
Religion/Theology	33	5	13	-	-	5	-	-	-	-	-	-	-	-	-	11
Social Sciences	180	19	17	4	37	45	-	-	23	4	-	5	4	5	-	17
Vo-tech Studies	2,584	189	118	207	179	410	7	46	272	576	99	57	42	39	9	334
Other	958	120	77	49	138	195	-	16	101	67	16	3	15	9	12	140
HIGH SCHOOL DIPLOMA	85,653	6,530	2,940	1,922	8,348	13,865	333	1,408	8,356	9,355	5,205	3,562	3,366	1,866	729	17,866
NO DIPLOMA	25,474	572	107	106	1,146	889	184	147	2,850	2,634	2,427	1,311	1,465	962	10	10,643
MALE																
ALL DEGREES																
Total	74,828	8,734	7,450	2,201	6,632	3,686	14	1,684	4,541	12,566	4,871	4,871	4,302	2,648	954	9,664
Agriculture/Forestry	378	66	75	25	62	4	-	-	6	29	13	18	7	54	4	14
Biology	500	131	162	32	40	23	-	10	4	16	20	7	-	14	9	33
Business/Management	5,037	1,953	463	142	1,045	415	-	47	112	267	72	93	51	57	84	237
Economics	421	150	43	-	94	26	-	10	4	11	8	4	11	3	4	54
Education	1,506	345	676	47	141	49	-	6	24	48	3	29	19	19	4	96
Engineering	3,144	517	1,252	335	212	118	-	8	35	267	64	55	41	13	26	198
English/Journalism	356	146	990	4	49	21	-	-	2	10	10	-	6	-	-	18
Home Economics	20	7	-	-	-	-	-	-	-	5	-	4	-	-	-	4
Law	747	66	522	12	17	24	-	9	4	13	2	3	4	-	7	40
Liberal Arts/Humanities	1,506	225	465	41	157	98	-	31	74	128	81	41	46	12	18	90
Mathematics/Statistics	541	130	181	9	39	29	-	3	26	56	4	-	5	4	11	45
Medicine/Dentistry	624	29	485	24	3	5	-	-	12	-	6	-	-	-	-	60
Nursing/Pharmacy/Technical Health	418	55	220	44	35	8	-	6	18	4	-	8	-	5	5	8
Physical/Earth Sciences	689	124	240	114	41	26	-	19	25	27	4	15	-	-	5	49
Police Science/Law Enforcement	361	47	35	15	13	6	-	142	-	15	-	24	14	-	5	44
Psychology	459	107	166	26	45	14	-	6	13	19	-	4	-	6	9	45
Religion/Theology	392	59	248	8	19	10	-	10	4	19	-	-	4	4	-	8
Social Sciences	1,058	281	256	37	139	99	-	31	4	33	20	20	20	2	9	79
Vo-tech Studies	1,639	113	121	157	88	48	-	39	115	596	78	39	39	35	17	143
Other	1,607	405	287	81	249	116	-	43	77	112	32	19	19	13	64	93
No post-secondary degree—no field	53,427	3,756	1,464	1,051	4,145	2,526	14	1,265	3,939	10,892	4,454	4,015	4,015	2,648	672	8,338
ADVANCED DEGREES																
Total	5,653	1,338	3,152	157	354	111	-	33	30	55	26	11	11	8	53	315
Agriculture/Forestry	53	8	25	5	10	-	-	-	-	-	-	4	-	-	-	-
Biology	125	18	89	4	4	-	-	-	-	4	7	-	-	-	-	-
Business/Management	933	472	195	20	136	45	-	-	-	6	4	3	-	6	20	25
Economics	78	22	26	-	7	5	-	-	-	-	4	-	-	-	-	12
Education	755	216	420	16	47	12	-	-	-	3	-	4	-	2	4	31
Engineering	546	94	360	34	17	2	-	-	-	5	4	-	-	-	4	25
English/Journalism	76	26	33	4	8	4	-	-	-	-	-	-	-	-	-	-
Home Economics	5	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-
Law	656	81	502	7	15	4	-	4	-	-	2	-	2	-	7	30
Liberal Arts/Humanities	287	28	184	4	22	9	-	-	4	4	5	-	4	-	-	23

Table 6. Primary Occupation by Degree and Field for Persons 18 to 64 Years: Spring 1990—Continued
(Numbers in thousands)

Degree, field	Primary occupation															
	Total	Execu- tive, admin- istrative	Profes- sional specialty	Techni- cians and related support	Sales	Admin- istrative support, includes clerical	Private house- hold	Protec- tive service	Service, except protec- tive and house- hold	Precision produc- tion, craft, and repair	Machine opera- tors, assem- blers, and inspec- tors	Trans- porta- tion and mater- ial moving	Hand- lers, equip- ment cleaners, helpers, and laborers	Farming, forestry and fishing	Armed forces	No reported work ¹
Mathematics/Statistics	122	21	78	-	-	-	-	-	-	4	-	-	-	-	-	19
Medicine/Dentistry	566	23	476	12	3	-	-	-	9	-	-	-	-	-	-	43
Nursing/Pharmacy/ Technical Health	126	24	73	9	12	-	-	-	-	-	-	-	-	-	4	5
Physical/Earth Sciences	241	44	137	23	8	4	-	-	-	4	-	-	-	-	-	21
Police Science/Law Enforcement	26	11	11	-	-	-	-	4	-	-	-	-	-	-	-	-
Psychology	172	34	83	4	9	3	-	-	-	2	-	-	-	-	5	32
Religion/Theology	262	39	185	-	16	9	-	10	-	-	-	-	-	-	-	4
Social Sciences	265	77	148	4	11	-	-	10	-	-	-	-	-	-	-	15
Vo-tech Studies	27	6	2	-	4	-	-	-	-	-	-	-	-	-	-	15
Other	335	95	123	10	24	15	-	4	17	18	-	-	4	-	8	16
BACHELOR'S																
Total	10,706	3,004	2,394	618	1,536	657	-	209	261	615	179	178	124	138	159	635
Agriculture/Forestry	184	24	47	4	30	4	-	-	-	18	8	5	-	25	4	14
Biology	351	96	73	28	38	21	-	6	4	12	13	7	-	14	9	33
Business/Management	3,037	1,260	196	84	677	214	-	38	52	179	30	59	31	36	30	148
Economics	332	124	16	-	67	14	-	10	4	9	4	4	11	3	4	41
Education	661	125	248	31	78	28	-	4	24	18	3	21	19	17	-	45
Engineering	1,956	357	791	196	154	70	-	-	35	138	32	45	8	13	20	96
English/Journalism	257	112	51	-	41	15	-	-	-	10	5	-	6	-	-	18
Home Economics	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Law	53	4	11	4	2	19	-	-	-	6	-	2	-	-	-	5
Liberal Arts/Humanities	786	147	242	20	79	47	-	13	41	62	36	6	24	6	14	50
Mathematics/Statistics	322	96	103	9	36	26	-	3	-	19	-	-	-	-	11	20
Medicine/Dentistry	42	5	9	8	-	5	-	-	4	-	6	-	-	-	-	5
Nursing/Pharmacy/ Technical Health	195	28	113	19	2	8	-	-	5	4	-	8	-	5	-	4
Physical/Earth Sciences	351	80	99	78	29	22	-	10	4	4	4	3	-	-	5	13
Police Science/Law Enforcement	145	8	16	15	6	6	-	70	-	-	-	-	-	-	-	23
Psychology	271	69	79	22	33	11	-	6	13	12	-	4	-	6	3	13
Religion/Theology	113	16	50	8	3	2	-	-	4	19	-	-	4	4	-	4
Social Sciences	703	196	96	33	101	76	-	20	36	33	20	3	16	2	9	61
Vo-tech Studies	122	11	26	20	5	9	-	2	-	32	-	-	5	-	7	5
Other	821	241	126	38	136	61	-	28	36	41	18	13	-	4	43	36
ASSOCIATE/VOCA- TIONAL																
Total	5,042	636	441	376	596	371	-	177	312	1,005	212	189	153	95	70	407
Business/Management	1,066	221	70	36	233	155	-	8	59	82	38	31	20	15	34	64
Engineering	642	65	101	104	41	47	-	8	-	124	26	11	33	-	5	77
Liberal Arts/Humanities	433	50	36	18	57	43	-	18	30	62	41	35	18	3	4	16
Vo-tech Studies	1,480	96	92	137	79	39	-	37	115	564	78	50	34	35	9	123
All Others	1,409	204	140	79	188	87	-	106	106	173	27	62	48	42	18	127
HIGH SCHOOL DIPLOMA	40,792	3,365	1,389	966	3,788	2,233	14	1,185	2,888	8,503	3,155	3,235	2,790	1,586	662	4,995
NO DIPLOMA	12,635	370	75	65	356	293	-	80	8,503	2,389	1,299	1,257	1,224	822	10	3,343
FEMALE																
ALL DEGREES																
Total	77,966	6,139	8,301	1,991	6,674	15,149	566	403	8,400	1,238	3,339	421	851	497	91	23,924
Agriculture/Forestry	66	-	28	-	5	10	4	-	5	5	-	-	-	5	-	4
Biology	355	36	109	38	40	32	-	-	4	4	-	5	-	-	-	87
Business/Management	3,068	879	263	83	289	811	8	36	63	15	24	-	4	4	-	570
Economics	202	41	30	20	17	32	-	-	4	-	4	4	-	-	-	49
Education	3,939	360	2,169	34	158	257	7	26	134	12	25	6	-	8	-	724
Engineering	451	68	98	56	23	80	-	-	9	4	4	4	-	-	8	97
English/Journalism	869	114	283	12	74	78	-	-	30	-	-	-	4	16	14	245
Home Economics	338	33	103	-	31	49	-	-	32	7	-	-	-	-	-	82
Law	261	18	139	11	4	33	-	3	4	-	-	-	-	-	-	48
Liberal Arts/Humanities	2,153	286	599	95	229	326	3	3	115	9	31	-	-	4	-	450
Mathematics/Statistics	278	36	113	26	30	24	-	-	13	4	4	-	-	-	-	26
Medicine/Dentistry	391	21	191	49	7	18	-	-	24	4	-	4	4	5	-	64
Nursing/Pharmacy/ Technical Health	3,351	222	1,494	377	105	226	26	9	304	26	33	6	5	5	-	513
Physical/Earth Sciences	247	29	58	38	18	29	-	-	23	4	-	-	3	3	-	42
Police Science/Law Enforcement	100	11	12	4	7	27	-	12	13	-	5	-	-	-	-	10
Psychology	669	100	269	28	37	123	-	-	29	-	4	-	-	-	2	77
Religion/Theology	82	16	43	-	-	10	-	-	-	-	-	-	3	-	-	11
Social Sciences	913	182	243	31	54	147	4	9	63	8	-	4	-	5	-	163
Vo-tech Studies	1,117	95	30	70	105	375	7	8	157	12	20	7	9	3	-	219

Table 6. Primary Occupation by Degree and Field for Persons 18 to 64 Years: Spring 1990—Continued

(Numbers in thousands)

Degree, field	Primary occupation															
	Total	Executive, administrative	Professional specialty	Technicians and related support	Sales	Administrative support, includes clerical	Private household	Protective service	Service, except protective and household	Precision production, craft, and repair	Machine operators, assemblers, and inspectors	Transportation and material moving	Handlers, equipment cleaners, helpers, and laborers	Farming, forestry and fishing	Armed forces	No reported work
Other	1,434	224	426	39	91	231	5	8	106	29	7	-	3	-	-	266
No post-secondary degree—no field	57,702	3,346	1,584	979	5,349	12,229	503	288	7,269	1,097	3,178	381	817	441	67	20,173
ADVANCED DEGREES																
Total	3,930	587	2,337	80	125	213	9	9	60	4	5	-	-	-	2	499
Agriculture/Forestry	10	-	5	-	-	-	-	-	-	-	-	-	-	-	-	4
Biology	52	4	41	-	4	-	-	-	-	-	-	-	-	-	-	3
Business/Management	289	164	64	4	18	21	-	-	-	-	-	-	-	-	-	18
Economics	11	3	-	-	4	-	-	-	-	-	-	-	-	-	-	4
Education	1,337	154	904	4	24	43	5	5	16	-	-	-	-	-	-	183
Engineering	55	8	36	8	-	4	-	-	-	-	-	-	-	-	-	-
English/Journalism	141	18	55	-	30	6	-	-	-	-	-	-	-	-	-	31
Home Economics	43	10	17	-	-	-	-	-	4	-	-	-	-	-	-	11
Law	184	9	139	-	-	9	-	-	-	-	-	-	-	-	-	27
Liberal Arts/Humanities	338	30	142	13	26	51	-	-	-	-	5	-	-	-	-	70
Mathematics/Statistics	78	6	64	4	4	-	-	-	-	-	-	-	-	-	-	-
Medicine/Dentistry	193	13	162	4	-	-	-	-	7	-	-	-	-	-	-	7
Nursing/Pharmacy/Technical Health	370	64	200	17	4	8	-	-	18	-	-	-	-	-	-	60
Physical/Earth Sciences	51	-	24	4	-	16	-	-	-	-	-	-	-	-	-	7
Police Science/Law Enforcement	4	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-
Psychology	210	29	143	-	-	25	-	-	-	-	-	-	-	-	-	11
Religion/Theology	45	11	29	-	-	5	-	-	-	-	-	-	-	-	-	-
Social Sciences	218	24	117	7	7	13	4	4	15	-	-	-	-	-	-	26
Vo-tech Studies	12	-	4	-	5	-	-	-	-	-	-	-	-	-	-	3
Other	290	37	192	12	-	12	-	-	-	4	-	-	-	-	-	33
BACHELOR'S																
Total	9,984	1,593	3,378	472	763	1,115	15	41	414	64	47	17	13	36	22	1,995
Agriculture/Forestry	22	-	7	-	-	-	-	-	5	5	-	-	-	5	-	-
Biology	285	28	68	38	36	26	-	-	4	4	-	5	-	-	-	76
Business/Management	1,476	493	161	59	184	267	-	-	39	7	4	-	-	-	-	262
Economics	189	38	30	20	13	30	-	-	4	-	4	4	-	-	-	45
Education	2,361	201	1,209	30	125	161	2	17	110	8	14	4	-	8	-	472
Engineering	214	29	54	37	16	4	-	-	3	-	-	-	-	-	8	63
English/Journalism	691	92	228	12	44	68	-	-	30	-	-	-	4	16	14	183
Home Economics	249	19	82	-	28	49	-	-	9	7	-	-	-	-	-	55
Law	15	5	-	3	-	-	-	-	-	-	-	-	-	-	-	7
Liberal Arts/Humanities	1,308	197	397	71	139	160	3	3	49	4	14	-	-	-	-	270
Mathematics/Statistics	140	25	49	19	8	15	-	-	-	-	-	-	-	-	-	24
Medicine/Dentistry	88	-	4	37	4	-	-	-	-	-	-	-	-	-	-	43
Nursing/Pharmacy/Technical Health	1,069	82	597	77	39	71	4	4	60	9	2	-	-	5	-	138
Physical/Earth Sciences	140	24	30	19	7	3	-	-	11	4	-	-	3	3	-	35
Police Science/Law Enforcement	51	11	8	-	4	12	-	8	-	-	5	-	-	-	-	4
Psychology	392	64	122	19	37	69	-	-	25	-	-	-	-	-	-	57
Religion/Theology	21	5	14	-	-	-	-	-	-	-	-	-	3	-	-	-
Social Sciences	606	146	121	20	37	113	-	5	35	4	-	4	-	-	-	123
Vo-tech Studies	10	2	-	-	-	4	-	-	-	-	-	-	-	-	-	4
Other	637	136	195	10	42	64	5	4	29	12	4	-	3	-	-	133
ASSOCIATE/VOCATIONAL																
Total	6,371	612	1,003	460	437	1,592	40	65	657	74	109	24	21	20	-	1,257
Business/Management	1,303	222	57	21	87	523	8	36	24	7	20	-	4	4	-	290
Liberal Arts/Humanities	507	61	59	10	64	116	-	-	65	4	12	-	-	4	-	110
Nursing/Pharmacy/Technical Health	1,892	78	697	284	82	148	22	5	225	17	31	6	5	-	-	315
Vo-tech Studies	1,094	93	26	70	100	370	7	8	157	12	20	7	9	3	-	211
All Others	1,575	160	164	75	124	435	3	16	186	34	26	11	3	9	-	331
HIGH SCHOOL DIPLOMA	44,862	3,145	1,552	936	4,559	11,633	319	221	5,470	853	2,050	327	576	281	67	12,873
NO DIPLOMA	12,640	202	32	43	790	596	184	67	1,799	245	1,128	54	241	160	-	7,300

- Represents zero.

¹Includes those not in the labor force.

Table 7. Characteristics of Persons Having Received Work-Related Training: Spring 1990

(Numbers in thousands)

Characteristic	Total	Sex		Race		Hispanic origin ¹	Education		
		Male	Female	White	Black		Less than 9 years	9 to 12 years	More than 12 years
All persons, 18 to 64.....	152,815	74,828	77,987	129,575	17,891	12,463	9,714	77,599	65,502
Persons receiving work training ...	39,238	19,950	19,288	33,984	4,241	2,218	1,050	20,447	17,742
Uses training on current or most recent job	26,563	14,073	12,489	23,595	2,316	1,486	580	12,671	13,311
Location:									
Apprenticeship	1,749	1,411	338	1,616	76	114	70	999	680
Business/vo-tech school	10,213	4,388	5,825	8,659	1,301	537	192	6,562	3,460
Community college	4,077	1,664	2,413	3,722	275	220	92	1,838	2,147
Four-year college	2,738	1,396	1,341	2,488	198	89	22	355	2,360
High school vo-tech program	2,158	1,068	1,090	1,875	250	183	36	1,798	324
Training program at work	13,330	7,393	5,938	11,774	1,164	598	270	5,903	7,156
Military	2,229	1,990	238	1,968	180	139	12	1,151	1,065
Correspondence	811	608	202	762	31	28	21	378	411
Previous job	1,821	968	853	1,636	134	134	87	705	1,029
Sheltered workshop	392	190	202	309	83	5	25	222	146
Vocational rehab center	919	465	454	632	275	66	101	561	257
Other	7,598	3,611	3,987	6,601	780	398	266	3,363	3,969
Year of training:									
1990	7,348	3,967	3,381	6,628	564	290	90	3,001	4,257
1989	5,207	2,573	2,634	4,491	575	316	91	2,489	2,627
1988	3,364	1,641	1,723	2,852	432	222	86	1,751	1,527
1987	2,666	1,343	1,323	2,240	337	166	113	1,402	1,151
1986	1,801	834	967	1,584	157	143	51	930	820
1985 or before	18,852	9,592	9,260	16,188	2,176	1,081	619	10,873	7,360
Program paid for by:									
Self or family	11,540	4,708	6,832	10,348	914	588	215	6,014	5,311
Employer	17,834	10,019	7,815	16,059	1,379	880	426	7,885	9,524
Federal, state, or local government	10,429	5,543	4,886	8,079	2,010	748	387	6,675	3,366
Someone else	1,000	553	447	859	99	84	41	586	373
Participated in government sponsored training program ²	4,479	2,221	2,258	3,134	1,128	396	206	2,849	1,424
Length of training program (average number of weeks)	22	25	20	23	21	22	20	25	19

¹Persons of Hispanic origin may be of any race²Includes: Job Training Partnership Act (JTPA), Comprehensive Employment Training Act (CETA), Job Opportunities and Basic Skills (JOBS), Work Incentive Program (WIN), Food Stamps Work Program, Veterans' Training Programs, and other programs sponsored by the Welfare Program and AFDC

Appendix A. Overview of the SIPP Program

BACKGROUND

The Survey of Income and Program Participation (SIPP) provides a major expansion in the kind and amount of information available to analyze the economic situation of households and persons in the United States. The information supplied by this survey is expected to provide a better understanding of the level and changes in the level of well-being of the population and of how economic situations are related to the demographic and social characteristics of individuals. The data collected in SIPP will be especially useful in studying Federal transfer programs, estimating program cost and effectiveness, and assessing the effect of proposed changes in program regulations and benefit levels. Analysis of other important national issues such as tax reform, Social Security program costs, and national health insurance can be expanded and refined, based on the information from this survey.

The first interviews in the SIPP took place in October 1983, nearly 8 years after the research and developmental phase, the Income Survey Development Program (ISDP), was initiated by the Department of Health, Education, and Welfare in 1975. Between 1975 and 1980 extensive research was undertaken to design and test new procedures for collecting income and related socioeconomic data on a subannual basis and in a longitudinal framework. Much of the work centered around four experimental field tests that were conducted in collaboration with the Bureau of the Census to examine different concepts, procedures, questionnaires, and recall periods. Two of the tests were restricted to a small number of geographic sites; the other two were nationwide. In the first nationwide test, the 1978 Research Panel, approximately 2,000 households were interviewed. Because of the relatively small number of interviews, controlled experimental comparisons of alternatives were not possible; however, the panel did demonstrate that many new ideas and methods were feasible. It also laid a foundation for the largest and most complex test: the 1979 Research Panel. This panel consisted of a nationally representative sample of 8,200 households and provided a vehicle for feasibility tests and controlled experiments of alternative design features.

In the fall of 1981, virtually all funding for ISDP research and planning of the continuing SIPP program was deleted from the budget of the Social Security Administration. The loss of funding for fiscal year 1982 brought all work on the new survey to a halt. In fiscal

year 1983, however, money for initiation of the new survey was allotted in the budget of the Bureau of the Census. Work began almost immediately in preparation for the survey start in October 1983. The design of the questionnaire for the first interview was similar in structure to that used in the 1979 ISDP panel study with two important exceptions. First, the reference period for the questions was extended from 3 months to 4 months in order to reduce the number of interviews and, therefore, lower costs. Second, the questions covering labor force activity were expanded in order to provide estimates that were closer, on a conceptual basis, to those derived from the Current Population Survey (CPS). The design also incorporated a number of other modifications resulting from experience with the 1979 pilot study.

SURVEY CONTENT

There are three basic elements contained in the overall design of the survey content. The first is a control card that serves several important functions. The control card is used to record basic social and demographic characteristics for each person in the household at the time of the initial interview. Because households are interviewed a total of 8 or 9 times, the card is also used to record changes in characteristics such as age, educational attainment, and marital status and to record the dates when persons enter or leave the household. Finally, during each interview, information on each source of income received and the name of each job or business is transcribed to the card so that this information can be used in the updating process in subsequent interviews.

The second major element of the survey content is the core portion of the questionnaire. The core questions are repeated at each interview and cover labor force activity, the types and amounts of income received during the 4-month reference period, and participation status in various programs. Some of the important elements of labor force activity are recorded separately for each week of the period. Income reciprocity and amounts are recorded on a monthly basis with the exception of amounts of property income (interest, dividends, rent, etc.). Data for these types are recorded as totals for the 4-month period. The core also contains questions covering attendance in postsecondary schools, private health insurance coverage, public or subsidized rental housing, low-income energy assistance, and school breakfast and lunch participation.

The third major element is the various supplements or topical modules that are included during selected household visits. The topical modules cover areas that need not be examined every 4 months. Certain of these topical modules are considered to be so important that they are viewed as an integral part of the overall survey. Other topical modules have more specific and more limited purposes.

Questions on degrees and work training were first asked in the third wave (interview) of the 1984 panel as part of the Education and Training History Module. This module was not administered in the 1985 panel but beginning with the 1986 panel an Education and Training History has been administered as part of the second wave of each SIPP panel. Appendix E shows the Education and Work Training History as it appeared in the 1990 panel, wave 2 interview.

SAMPLE DESIGN

The SIPP sample design for the 1990 panel consists of about 29,000 housing units selected to represent the noninstitutional population of the United States. (See appendix C for more details on the procedures used to select the sample.) About 23,600 of these were occupied and eligible for interview. Each household in the sample was scheduled to be interviewed at 4-month intervals over a period of 2.5 years beginning in February 1990. The reference period for the questions is the 4-month period preceding the interview. For example, households interviewed in February 1990 were asked questions for the months October, November, December, and January. This household was interviewed again in June 1990 for the February through May period. The sample households within a given panel are divided into four subsamples of nearly equal size. These subsamples are called rotation groups and one rotation group is interviewed each month. In general, one cycle of four interviews covering the entire sample, using the same questionnaire, is called a wave. This design was chosen because it provides a smooth and steady work load for data collection and processing.

Interviews for the second wave of the 1990 panel were conducted during June, July, August, and September of 1990. In each case, the reference period was the 4 months prior to the interview. Table A-1 shows the reference and interview months for the second wave data used in this report. As is seen, most of the reference period covers the spring of 1990.

SURVEY OPERATIONS

Data collection operations are managed through the Census Bureau's 12 permanent regional offices. A staff of interviewers assigned to SIPP conduct interviews by personal visit each month with most interviewing completed during the first 2 weeks of that month. Completed questionnaires are transmitted to the regional offices

Table A-1. Interview and Reference Periods for the Second Wave of the 1990 SIPP Panel

Rotation	Interview months	Reference months
2	June	Feb.- May
3	July	March- June
4	August	April- July
1	September	May- August

where they undergo an extensive clerical edit before being entered into the Bureau's SIPP data processing system. Upon entering this processing system the data are subjected to a detailed computer edit. Errors identified in this phase are corrected and computer processing continues.

Two of the major steps of computer processing are the assignment of weights to each sample person and imputation for missing survey responses. The weighting procedures assure that SIPP estimates of the number of persons agree with independent estimates of the population within specified age, race, and sex categories. The procedures also assure close correspondence with monthly CPS estimates of households. In almost all cases, a survey nonresponse is assigned a value in the imputation phase of processing. The imputation for missing responses is based on procedures generally referred to as the "hot deck" approach. This approach assigns values for nonresponses from sample persons who did provide responses and who have characteristics similar to those of the nonrespondents.

The longitudinal design of SIPP dictates that all persons 15 years old and over present as household members at the time of the first interview be part of the survey throughout the entire 2.5 year period. To meet this goal, the survey collects information useful in locating persons who move. In addition, field procedures were established that allow for the transfer of sample cases between regional offices. Persons moving within a 100-mile radius of an original sampling area (a county or group of counties) are followed and continue with the normal personal interviews at 4-month intervals. Those moving to a new residence that falls outside the 100-mile radius of any SIPP sampling area are interviewed by telephone. The geographic areas defined by these rules contain more than 95 percent of the U.S. population.

Because most types of analysis using SIPP data will be dependent not on data for individuals but on groups of individuals (households, families, etc.), provisions were made to interview all "new" persons living with original sample persons (those interviewed in the first wave). These new sample persons entering the survey through contact with original sample persons are considered as part of the sample only while residing with the original sample person.

Appendix B. Definitions and Explanations

Population coverage. The estimates in this report are restricted to the civilian, noninstitutional population of the United States and members of the Armed Forces living off post or with their families on post. The estimates exclude group quarters.

Householder. Survey procedures call for listing first the person (or one of the persons) in whose name the home is owned or rented as of the interview date. If the house is owned jointly by a married couple, either the husband or the wife may be listed first, thereby becoming the reference person, or householder, to whom the relationship of other household members is recorded. One person in each household is designated as the "householder." The number of householders, therefore, is equal to the number of households.

Household. A household consists of all the persons who occupy a housing unit. A house, an apartment or other group of rooms, or a single room is regarded as a housing unit when it is occupied or intended for occupancy as separate living quarters; that is, when the occupants do not live and eat with any other persons in the structure and there is direct access from the outside or through a common hall.

For this report, the household composition was determined as of the interview date. A household includes the related family members and all the unrelated persons, if any, such as lodgers, foster children, wards, or employees who share the housing unit. A person living alone in a housing unit, or a group of unrelated persons sharing a housing unit as partners, is also counted as a household. The count of households excludes group quarters. Examples of group quarters include rooming and boarding houses, college dormitories, and convents and monasteries.

Family. A family is a group of two or more persons (one of whom is the householder) related by blood, marriage, or adoption and residing together; all such persons (including related subfamily members) are considered members of one family.

Family household. A family household is a household maintained by a family; any unrelated persons (unrelated subfamily members and/or secondary individuals) who may be residing there are included. The number of family households is equal to the number of families.

The count of family household members differs from the count of family members, however, in that the family household members include all persons living in the household, whereas family members include only the householder and his/her relatives.

Nonfamily household. A nonfamily household is a household maintained by a person living alone or with nonrelatives only.

Race. The population is divided into three groups on the basis of race: White, Black, and "other races." The last category includes American Indians, Asian/Pacific Islanders, and any other race except White and Black.

Persons of Hispanic origin. Hispanic origin was determined on the basis of a question that asked for self-identification of the person's origin or descent. Respondents were asked to select their origin (or the origin of some other household member) from a "flash card" listing ethnic origins. Persons of Hispanic origin, in particular, were those who indicated that their origin was Mexican, Puerto Rican, Cuban, Central or South American, or some other Spanish origin. It should be noted that persons of Hispanic origin may be of any race.

Mean duration. The estimate is based on the number of real calendar years taken to complete a given degree. The mean duration for a bachelor's degree (Table 5) is measured from the date of high school graduation to the date of bachelor's degree attainment. The average time spent obtaining advanced degrees is estimated from the date of bachelor's degree completion to the date of attainment of the highest degree.

Mean monthly income. The estimate is based on the total amount of income received by the individual during the 4 months prior to the interview month, divided by 4.

Mean monthly earnings. The estimate is based on the total of all earnings of the individual during the 4 months prior to the interview month, divided by the number of those months in which earnings were actually received.

Primary occupation. Field of employment is divided into 15 general occupational categories as defined by the Census Bureau. Detailed occupation codes were available for up to two employers and two self-employments.

The primary occupation was chosen based on the job with the most hours worked. The last general occupational category is for persons who have never worked. This category includes persons not currently working (not employed or not in the labor force) as well as persons with no work experience.

Work activity. The estimate is based on the total number of months during the 4 months prior to the interview month, when the individual held a job for any amount of time.

Symbols. A dash (-) represents zero or a number which rounds to zero; "B" means that the base is too small to show the derived measure (less than 200,000 persons).

Rounding of estimates. Individual numbers are rounded to the nearest thousand without being adjusted to group totals, which are independently rounded. Derived measures are based on unrounded numbers when possible; otherwise, they are based on the rounded numbers.

Appendix C. Source and Accuracy Statement

SOURCE OF DATA

The SIPP universe is the noninstitutionalized resident population living in the United States. This population includes persons living in group quarters, such as dormitories, rooming houses, and religious group dwellings. Crew members of merchant vessels, Armed Forces personnel living in military barracks, and institutionalized persons, such as correctional facility inmates and nursing home residents, were not eligible to be in the survey. Also, United States citizens residing abroad were not eligible to be in the survey. Foreign visitors who work or attend school in this country and their families were eligible; all others were not eligible. With the exceptions noted above, persons who were at least 15 years of age at the time of the interview were eligible to be interviewed in the survey.

The 1990 panel SIPP sample is located in 284 Primary Sampling Units (PSUs) each consisting of a county or a group of contiguous counties. Within these PSUs, expected clusters of two living quarters (LQs) were systematically selected from lists of addresses prepared for the 1980 decennial census to form the bulk of the sample. To account for LQs built within each of the sample areas after the 1980 census, a sample containing clusters of four LQs was drawn from permits issued for construction of residential LQs up until shortly before the beginning of the panel.

In jurisdictions that don't issue building permits or have incomplete addresses, small land areas were sampled and expected clusters of four LQs within were listed by field personnel and then subsampled. In addition, sample LQs were selected from a supplemental frame that included LQs identified as missed in the 1980 census.

The 1990 panel differs from other panels as a result of oversampling for low income households. The panel contains an oversample of households headed either by Blacks, Hispanics, or females with no spouse present and living with relatives.

The first interview was conducted during February, March, April, and May of 1990. Approximately one-fourth of the sample was interviewed in each of these months. Each sample person was visited every 4 months thereafter. At each interview the reference period was the 4 months preceding the interview month.

Occupants of about 93 percent of all eligible living quarters participated in the first interview of the panel.

For subsequent interviews, only original sample persons (those in Wave 1 sample households and interviewed in Wave 1) and persons living with them were eligible to be interviewed. Original sample persons were followed if they moved to a new address, unless the new address was more than 100 miles from a SIPP sample area. Then, telephone interviews were attempted. All first wave noninterviewed households were automatically designated as noninterviews for all subsequent interviews. Additional noninterviews resulted when original sample persons moved to remote parts of the country and couldn't be reached by telephoning, moved without leaving a forwarding address, or refused to be interviewed.

As a part of most waves, subjects are covered that don't require repeated measurement during the panel - subjects are covered once during the panel or annually - and are of particular interest to data users and policy makers. Also, respondent burden is reduced by collecting data once for the panel or annually. A specific set of questions on a subject are referred to as a topical module. For this report the topical modules analyzed include questions on educational attainment. They were implemented in Wave 2 of the 1990 panel.

Noninterviews. Tabulations in this report were drawn from interviews conducted from June through September 1990. Table C-1 summarizes information on nonresponse for the interview months in which the data used to produce this report were collected.

Table C-1. Household Sample Size by Month and Interview Status

Month	Eligible	Interviewed	Non-interviewed	Non-response rate(%) ¹
June 1990	6000	5300	700	12
July 1990	6100	5300	800	13
Aug 1990	6100	5300	800	13
Sept 1990	6100	5300	800	13

¹Due to rounding of all numbers at 100, there are some inconsistencies. The percentage was calculated using unrounded numbers.

Some respondents do not respond to some of the questions. Therefore, the overall nonresponse rate for some items such as income and money related items is higher than the nonresponse rates in table C-1. For

more discussion of nonresponse see the *Quality Profile for the Survey of Income and Program Participation*, May 1990, by T. Jabine, K. King, and R. Petroni, available from Customer Services, Data Users Services Division of the U.S. Census Bureau (301-763-6100).

WEIGHTING PROCEDURE

The procedure used to derive SIPP person weights in each panel involved several stages of weight adjustments. In the first wave, each person received a base weight equal to the inverse of his/her probability of selection. For each subsequent interview, each person received a base weight that accounted for following movers.

A factor was applied to each interviewed person's weight to account for the SIPP sample areas not having the same population distribution as the strata from which they were selected.

A noninterview adjustment factor was applied to the weight of every occupant of interviewed households to account for persons in noninterviewed occupied households which were eligible for the sample. (Individual nonresponse within partially interviewed households was treated with imputation. No special adjustment was made for noninterviews in group quarters.)

The Bureau used complex techniques to adjust the weights for nonresponse. For a further explanation of the techniques used, see the *Nonresponse Adjustment Methods for Demographic Surveys at the U.S. Bureau of the Census*, November 1988, Working paper 8823, by R. Singh and R. Petroni. The success of these techniques in avoiding bias is unknown. An example of successfully avoiding bias can be found in "Current Nonresponse Research for the Survey of Income and Participation" (paper by Petroni, presented at the Second International Workshop on Household Survey Nonresponse, October 1991).

An additional stage of adjustment to persons' weights was performed to reduce the mean square errors of the survey estimates. This was accomplished by ratio adjusting the sample estimates to agree with monthly Current Population Survey (CPS) type estimates of the civilian (and some military) noninstitutional population of the United States by demographic characteristics including age, sex, and race as of the specified date. The CPS estimates by age, sex, and race were themselves brought into agreement with estimates from the 1980 decennial census which have been adjusted to reflect births, deaths, immigration, emigration, and changes in the Armed Forces since 1980. In addition, SIPP estimates were controlled to independent Hispanic controls and an adjustment was made so that husbands and wives within the same household were assigned equal weights. All of the above adjustments were implemented for each reference month and the interview month.

ACCURACY OF ESTIMATES

SIPP estimates are based on a sample; they may differ somewhat from the figures that would have been obtained if a complete census had been taken using the same questionnaire, instructions, and enumerators. There are two types of errors possible in an estimate based on a sample survey: nonsampling and sampling. We are able to provide estimates of the magnitude of SIPP sampling error, but this is not true of nonsampling error. Found in the next sections are descriptions of sources of SIPP nonsampling error, followed by a discussion of sampling error, its estimation, and its use in data analysis.

Nonsampling Variability. Nonsampling errors can be attributed to many sources, e.g., inability to obtain information about all cases in the sample; definitional difficulties; differences in the interpretation of questions; inability or unwillingness on the part of the respondents to provide correct information; inability to recall information; errors made in the following: collection such as in recording or coding the data, processing the data, estimating values for missing data; biases resulting from the differing recall periods caused by the interviewing pattern used; and undercoverage. Quality control and edit procedures were used to reduce errors made by respondents, coders and interviewers. More detailed discussions of the existence and control of nonsampling errors in the SIPP can be found in the *SIPP Quality Profile*.

Undercoverage in SIPP results from missed living quarters and missed persons within sample households. It is known that undercoverage varies with age, race, and sex. Generally, undercoverage is larger for males than for females and larger for Blacks than for Nonblacks. Ratio estimation to independent age-race-sex population controls partially corrects for the bias due to survey undercoverage. However, biases exist in the estimates to the extent that persons in missed households or missed persons in interviewed households have characteristics different from those of interviewed persons in the same age-race-sex group. Further, the independent population controls used have not been adjusted for undercoverage in the Census.

Comparability with Other Estimates. Caution should be exercised when comparing data from this report with data from other SIPP publications or with data from other surveys. The comparability problems are caused by such sources as the seasonal patterns for many characteristics, different nonsampling errors, and different concepts and procedures. Refer to the *SIPP Quality Profile* for known differences with data from other sources and further discussion.

Sampling Variability. Standard errors indicate the magnitude of the sampling error. They also partially measure the effect of some nonsampling errors in response and

enumeration, but do not measure any systematic biases in the data. The standard errors for the most part measure the variations that occurred by chance because a sample rather than the entire population was surveyed.

USES AND COMPUTATION OF STANDARD ERRORS

Confidence Intervals. The sample estimate and its standard error enable one to construct confidence intervals, ranges that would include the average result of all possible samples with a known probability. For example, if all possible samples were selected, each of these being surveyed under essentially the same conditions and using the same sample design, and if an estimate and its standard error were calculated from each sample, then:

1. Approximately 68 percent of the intervals from one standard error below the estimate to one standard error above the estimate would include the average result of all possible samples.
2. Approximately 90 percent of the intervals from 1.6 standard errors below the estimate to 1.6 standard errors above the estimate would include the average result of all possible samples.
3. Approximately 95 percent of the intervals from two standard errors below the estimate to two standard errors above the estimate would include the average result of all possible samples.

The average estimate derived from all possible samples is or is not contained in any particular computed interval. However, for a particular sample, one can say with a specified confidence that the average estimate derived from all possible samples is included in the confidence interval.

Hypothesis Testing. Standard errors may also be used for hypothesis testing, a procedure for distinguishing between population characteristics using sample estimates. The most common types of hypotheses tested are 1) the population characteristics are identical versus 2) they are different. Tests may be performed at various levels of significance, where a level of significance is the probability of concluding that the characteristics are different when, in fact, they are identical.

All statements of comparison in the report have passed a hypothesis test at the 0.10 level of significance or better. This means that, for differences cited in the report, the estimated absolute difference between parameters is greater than 1.6 times the standard error of the difference.

To perform the most common test, compute the difference $X_A - X_B$, where X_A and X_B are sample estimates of the characteristics of interest. A later

section explains how to derive an estimate of the standard error of the difference $X_A - X_B$. Let that standard error be S_{DIFF} . If $X_A - X_B$ is between -1.6 times S_{DIFF} and $+1.6$ times S_{DIFF} , no conclusion about the characteristics is justified at the 10 percent significance level. If, on the other hand, $X_A - X_B$ is smaller than -1.6 times S_{DIFF} or larger than $+1.6$ times S_{DIFF} , the observed difference is significant at the 10 percent level. In this event, it is commonly accepted practice to say that the characteristics are different. Of course, sometimes this conclusion will be wrong. When the characteristics are, in fact, the same, there is a 10 percent chance of concluding that they are different.

Note that as more tests are performed, more erroneous significant differences will occur. For example, at the 10 percent significance level, if 100 independent hypothesis tests are performed in which there are no real differences, it is likely that about 10 erroneous differences will occur. Therefore, the significance of any single test should be interpreted cautiously.

Note Concerning Small Estimates and Small Differences. Summary measures are shown in the report only when the base is 200,000 or greater. Because of the large standard errors involved, there is little chance that estimates will reveal useful information when computed on a base smaller than 200,000. Also, nonsampling error in one or more of the small number of cases providing the estimate can cause large relative error in that particular estimate. Estimated numbers are shown, however, even though the relative standard errors of these numbers are larger than those for the corresponding percentages. These smaller estimates are provided primarily to permit such combinations of the categories as serve each user's needs. Therefore, care must be taken in the interpretation of small differences since even a small amount of nonsampling error can cause a borderline difference to appear significant or not, thus distorting a seemingly valid hypothesis test.

Standard Error Parameters and Tables and Their Use. Most SIPP estimates have greater standard errors than those obtained through a simple random sample because clusters of living quarters are sampled for the SIPP. To derive standard errors that would be applicable to a wide variety of estimates and could be prepared at a moderate cost, a number of approximations were required. Estimates with similar standard error behavior were grouped together and two parameters (denoted "a" and "b") were developed to approximate the standard error behavior of each group of estimates. Because the actual standard error behavior was not identical for all estimates within a group, the standard errors computed from these parameters provide an indication of the order of magnitude of the standard error for any specific estimate. These "a" and "b" parameters vary by characteristic and by demographic subgroup to which

the estimate applies. Table C-2 provides base "a" and "b" parameters to be used for estimates obtained from topical module data on educational attainment.

Table C-2. SIPP Generalized Variance Parameters

Characteristics ¹	a	b	f
1990 Panel, Wave 2			
Educational attainment of all persons (1)			
Total.....	-0.0000295	5424	1.00
White.....	-0.0000327	6012	1.05
Black.....	-0.0001411	3921	0.85
All others (2)			
Total			
Both sexes.....	-0.0000771	17,784	1.81
Male.....	-0.0001595	17,784	
Female.....	-0.0001493	17,784	
White			
Both sexes.....	-0.0000855	19,710	1.91
Male.....	-0.0001768	19,710	
Female.....	-0.0001655	19,710	
Black			
Both sexes.....	-0.0001723	4,755	0.94
Male.....	-0.0003704	4,755	
Female.....	-0.0003223	4,755	
1987 Panel, Wave 2			
Educational attainment of all persons.....	-0.0000540	9,535	1.33
1984 Panel, Wave 3			
Educational attainment of all persons.....	-0.0000471	6,073	1.06

¹For cross-tabulations, use the parameters of the characteristic with the smaller number within the parentheses.

For those users who wish further simplification, we have also provided general standard errors in tables C-3 and C-4. Note that these standard errors must be adjusted by a factor from table C-2. The standard errors resulting from this simplified approach are less accurate. Methods for using these parameters and tables for computation of standard errors are given in the following sections.

Standard Errors of Estimated Numbers. There are two ways to compute the approximate standard error, s_x , of an estimated number shown in this report. The first uses the formula

$$s_x = fs \quad (1)$$

where f is a factor from table C-2, and s is the standard error of the estimate obtained by interpolation from table C-3. Alternatively, s_x may be approximated by the formula,

$$s_x = \sqrt{ax^2 + bx} \quad (2)$$

from which the standard errors in table C-3 were calculated. Here x is the size of the estimate and a and b are the parameters in table C-2 associated with the particular type of characteristic. Use of formula 2 will provide more accurate results than the use of formula 1. When calculating standard errors for numbers from cross-tabulations involving different characteristics, use the factor or set of parameters for the characteristic which will give the largest standard error.

Table C-3. Standard Errors of Estimated Numbers of Persons

(Numbers in thousands)

Size of estimate	Standard error	Size of estimate	Standard error
200.....	33	17,000.....	289
300.....	40	22,000.....	324
600.....	57	26,000.....	348
1,000.....	73	30,000.....	369
2,000.....	104	50,000.....	444
3,000.....	127	80,000.....	495
5,000.....	162	100,000.....	497
8,000.....	204	130,000.....	454
11,000.....	237	140,000.....	426
13,000.....	256	150,000.....	387
15,000.....	273		

Illustration. SIPP estimates given in table 1 of the report show that there were 1,508,000 persons age 25-34 that earned a masters as their highest degree. The appropriate "a" and "b" parameters and "f" factor from table C-2 and the appropriate general standard error found by interpolation from table C-3 are

$$a = -0.0000295, b = 5424, f = 1.00, s = 89,000.$$

Using formula 1, the approximate standard error is

$$s_x = 89,000.$$

Using formula 2, the approximate standard error is

$$s_x = \sqrt{(-0.0000295)(1,508,000)^2 + (5424)(1,508,000)} = 90,000.$$

Using the standard error calculated from formula 2, the approximate 90-percent confidence interval as shown by the data is from 1,364,000 to 1,652,000. Therefore, a conclusion that the average estimate derived from all possible samples lies within a range computed in this way would be correct for roughly 90 percent of all samples.

Standard Errors of Estimated Percentages. The reliability of an estimated percentage, computed using sample data for both numerator and denominator, depends on the size of the percentage and its base. When the numerator and denominator of the percentage have different parameters, use the parameter (or appropriate factor) from table C-2 indicated by the numerator.

The approximate standard error, $s_{(x,p)}$, of an estimated percentage p can be obtained by use of the formula

$$s_{(x,p)} = fs \quad (3)$$

where p is the percentage of persons with a particular characteristic such as the percent of persons owning their own homes.

In this formula, f is the appropriate "f" factor from table C-2, and s is the standard error of the estimate obtained by interpolation from table C-4.

Alternatively, it may be approximated by the formula:

$$s_{(x,p)} = \sqrt{\frac{b}{x}(p)(100-p)} \quad (4)$$

from which the standard errors in table C-4 were calculated. Here x is the total number of persons in the base of the percentage, p is the percentage ($0 \leq p \leq 100$), and b is the "b" parameter in table C-2 associated with the characteristic in the numerator of the percentage. Use of this formula will give more accurate results than use of formula 3 above.

Illustration. Table 1 of the report shows that 5.4 percent of Hispanics earned a bachelors as their highest degree. The base of this percentage (x) is 13,548,000. The appropriate "b" parameter and "f" factor from table C-2 and the appropriate general standard error found by interpolation from table C-4 are

$$b = 5,424 \quad f = 1.00, \quad s = 0.45$$

Using formula 3, the approximate standard error is

$$s_{(x,p)} = 0.45\%.$$

Using formula 4, the approximate standard error is

$$s_{(x,p)} = \sqrt{\frac{5,424}{13,548,000} 5.4\% (100\% - 5.4\%)} = 0.45\%.$$

Consequently, the approximate 90-percent confidence interval as shown by these data is from 4.7 to 6.1 percent.

Standard Error of a Difference. The standard error of a difference between two sample estimates, x and y , is approximately equal to

$$s_{(x-y)} = \sqrt{s_x^2 + s_y^2 - 2rs_x s_y} \quad (5)$$

where s_x and s_y are the standard errors of the estimates x and y and r is the correlation coefficient between the characteristics estimated by x and y . The estimates can be numbers, averages, percents, ratios, etc. Underestimates or overestimates of standard error of differences result if the estimated correlation coefficient is overestimated or underestimated, respectively. In this report, r is assumed to be 0.

Illustration. Table 3 of the report shows 2 percent of males and 1 percent of females with post secondary degrees received their highest degree in the field of Mathematics/Statistics. The bases of the percentages for males and females are 23,481,000 and 22,615,000,

Table C-4. Standard Errors of Estimated Percentages of Persons

Base of estimated percentage (thousands)	Estimated percentages					
	≤ 1 or ≥ 99	2 or 98	5 or 95	10 or 90	25 or 75	50
200	1.6	2.3	3.6	4.9	7.1	8.2
300	1.3	1.9	2.9	4.0	5.8	6.7
600	0.9	1.3	2.1	2.9	4.1	4.8
1,000	0.73	1.0	1.6	2.2	3.2	3.7
2,000	0.52	0.73	1.1	1.6	2.3	2.6
3,000	0.42	0.60	0.9	1.3	1.8	2.1
5,000	0.33	0.46	0.72	1.0	1.4	1.6
8,000	0.26	0.36	0.57	0.78	1.1	1.3
11,000	0.22	0.31	0.48	0.67	1.0	1.1
13,000	0.20	0.29	0.45	0.61	0.9	1.0
15,000	0.19	0.27	0.41	0.57	0.8	1.0
17,000	0.18	0.25	0.39	0.54	0.77	0.9
22,000	0.16	0.22	0.34	0.47	0.68	0.79
26,000	0.14	0.20	0.31	0.43	0.63	0.72
30,000	0.13	0.19	0.29	0.40	0.58	0.67
50,000	0.10	0.15	0.23	0.31	0.45	0.52
80,000	0.08	0.12	0.18	0.25	0.36	0.41
100,000	0.07	0.10	0.16	0.22	0.32	0.37
130,000	0.06	0.09	0.14	0.19	0.28	0.32
140,000	0.06	0.09	0.14	0.19	0.27	0.31
150,000	0.06	0.08	0.13	0.18	0.26	0.30

respectively. The standard errors for these percentages are computed using formula 4 to be .2 percent and .2 percent. Assuming that these two estimates are not correlated, the standard error of the estimated difference of 1 percentage point is

$$s_{(x-y)} = \sqrt{(0.2\%)^2 + (0.2\%)^2} = 0.3\%$$

Suppose that it is desired to test at the 10-percent significance level whether the percentage of males with post-secondary degrees with their highest degree in

Mathematics/Statistics was different than the percentage of females with post-secondary degrees with their highest degree in Mathematics/Statistics. To perform the test, compare the difference of 1 percent to the product $1.6 \times .3 = 0.48$. Since the difference is greater than 1.6 times the standard error of the difference, the data show that the two sex groups are significantly different at the 10-percent significance level.

Standard Error of a Mean. The standard errors of all means published in this report are provided in detailed tables 2, 4, and 5.

Appendix D. Data Quality

Two principal indicators of the quality of data collected in household surveys are the magnitude of imputed and modified responses, and the accuracy of the responses that are provided. This appendix provides information on the imputation rates for selected items in the Education and Training History module from the second wave of the 1990 panel of the Survey of Income and Program Participation, and covers some of the problems encountered in collecting these data.

Imputed responses refer either to missing responses for specific questions or "items" in the questionnaire, or to responses that were rejected in the editing procedure because they were improbable or inconsistent. An example of the latter is when a person with only 6 years of regular schooling completed also said they had a PhD.

The estimates shown in this report are produced after all items have been edited and imputed wherever necessary. Missing or inconsistent responses to specific questions are assigned a value in the imputation phase of the data processing operation. The procedure used to assign or impute responses for missing or inconsistent data is referred to as the "hot deck" imputation method. This process assigns item values reported in the survey by respondents to those who to not respond. The respondent from whom the value is taken is called the "donor." Values from donors are assigned by controlling for demographic and labor force data available for both donors and nonrespondents.

Imputation rates for some of the major items in this report are shown in table D-1. The imputation rates are calculated by dividing the number of missing responses by the number of persons who should have responded to the item. Some items are imputed because a respondent did not respond to the entire module (or wave interview). About 5 percent of those persons eligible for the Education and Training History module did not respond to any question in the module (About half of

Table D-1. Imputation Rates for Selected Education and Training History Items

Item	Rate
Highest degree.....	7
Field of highest degree.....	9
Received job training	8
Specific training program	0-16
Uses training on current job	8

these were nonrespondents for the entire interview.) As table D-1 shows, about 7 percent of the highest degree responses, and 9 percent of the field of degree answers, were imputed.

Another means of determining data quality is by comparison of the weighted survey estimates to other data, either from elsewhere in the questionnaire, a different survey, or administrative estimates. Comparison of the educational attainment data to data from several other sources indicates that the estimates of highest degree attained are reasonable, given the limitations of the comparative data. Degree awards for recent years, both in terms of numbers and the fields they are received in, compares favorably to administrative estimates.

While about 39 million persons reported that they had received work training of some kind at some time, there is no way to determine the quality of this estimate. In fact, given the general nature of the question, the SIPP estimate may not truly reflect the number of persons who could actually respond positively to this item. Comparison of SIPP estimates to available administrative figures for specific job training programs also indicate large differences between the two. At least part of the discrepancy may be due to problems in the administrative estimates. However, it is also likely that many individuals who participate in government programs do not know the "official" name of the program, and are not able to give the "correct" answer when asked.

Appendix E. Facsimile of Questionnaires

Section 5 — TOPICAL MODULES (Continued)	
Part D — EDUCATION AND TRAINING HISTORY	
STATEMENT F	Now I would like to ask you a few questions about ...'s education and any work training ... may have received.
CHECK ITEM T28	Refer to cc items 31b and 31c. Has ... completed the 12th grade?
	8400 1 ☐ No, has not completed 12th grade 2 ☐ Yes, has completed 12th grade — <i>SKIP to item 3a</i>
1.	When did ... last attend elementary or high school?
	8402 Month x1 ☐ Don't know 8404 Year x1 ☐ Don't know 8408 1 ☐ Currently attending — <i>SKIP to Check Item T34, page 65</i> 2 ☐ Never attended
2.	Has ... received a high school diploma? (Include GED's.)
	8408 1 ☐ Yes 2 ☐ No — <i>SKIP to Check Item T31</i>
3a.	When did ... receive a high school diploma?
	8410 Month x1 ☐ Don't know 8412 Year x1 ☐ Don't know
b.	Was the high school that ... attended public; private, church-related; or private, not church-related?
	8414 1 ☐ Public 2 ☐ Private, church-related 3 ☐ Private, not church-related 4 ☐ Did not attend high school x1 ☐ DK
CHECK ITEM T29	Refer to cc item 31b. Was ...'s highest grade attended at least one year of college? (Codes 21 — 26 in cc item 31b)
	8418 1 ☐ Yes 2 ☐ No — <i>SKIP to Check Item T31</i>
4a.	When did ... first attend college, a university, or a technical, business, or vocational school beyond high school?
	8418 Month x1 ☐ Don't know 8420 Year x1 ☐ Don't know
b.	What is the highest degree beyond a high school diploma that ... has earned?
	8422 1 ☐ PhD or equivalent 2 ☐ Professional degree such as Dentistry, Medicine, Law, or Theology 3 ☐ Master's degree 4 ☐ Bachelor's degree 5 ☐ Associate degree 6 ☐ Vocational, technical, or business certificate or diploma 7 ☐ Has not earned a degree } <i>SKIP to 4f</i> x1 ☐ DK
c.	When did ... receive that degree?
	8424 Month x1 ☐ Don't know 8426 Year x1 ☐ Don't know
	(SHOW FLASHCARD FF)
d.	In what field of study did ... receive that degree?
	8428 Code Field of study x1 ☐ Don't know
CHECK ITEM T30	Refer to item 4b above. Did ... receive a degree higher than a Bachelor's degree? (Box 1, 2, or 3 marked in item 4b.)
	8430 1 ☐ Yes 2 ☐ No — <i>SKIP to Check Item T31</i>
4b.	When did ... receive his/her Bachelor's degree?
	8432 Month x1 ☐ Don't know 8434 Year x1 ☐ Don't know
	(SHOW FLASHCARD FF)
f.	In what field of study were the courses that ... took at college or university?
	8438 Code Field of study x1 ☐ Don't know
g.	When was the last time that ... was a student at a college or university?
	8438 Month x1 ☐ Don't know 8440 Year x1 ☐ Don't know OR 8442 1 ☐ Is still a student

Section 5 – TOPICAL MODULES (Continued)	
Part D – EDUCATION AND TRAINING HISTORY (Continued)	
CHECK ITEM T31	Refer to cc item 24. Is ... 65 years of age or older? 8444 1 ☐ Yes – SKIP to Check Item T34, page 65 2 ☐ No
5a. Has ... ever received training designed to help find a job, improve job skills or learn a new job?	8446 1 ☐ Yes 2 ☐ No x1 ☐ DK } SKIP to Check Item T34, page 65
b. Was any of this training sponsored by any of the following programs (Read categories)? Mark (X) all that apply.	8448 1 ☐ Job Training Partnership Act (JTPA) or Comprehensive Employment Training Act (CETA) 8450 2 ☐ Job Opportunities and Basic Skills (JOBS) or Work Incentive Program (WIN) 8452 3 ☐ Food Stamps Work Program 8454 4 ☐ Other program sponsored by the Welfare Program or AFDC 8456 5 ☐ Veterans' Training Programs 8458 6 ☐ No
c. What type of training program is (was) this? Mark (X) all that apply.	8460 1 ☐ Classroom training – job skills 8462 2 ☐ Classroom training – basic education 8464 3 ☐ On-the-job training 8466 4 ☐ Job search assistance 8468 5 ☐ Work experience 8470 6 ☐ Other
d. Where did ... receive this training? Mark (X) all that apply.	8472 1 ☐ Apprenticeship program 8474 2 ☐ Business, commercial, or vocational school 8476 3 ☐ Junior or community college 8478 4 ☐ Program completed at a 4 year college or graduate school 8480 5 ☐ High school vocational program 8482 6 ☐ Training program at work 8484 7 ☐ Military (exclude basic training) 8486 8 ☐ Correspondence course 8488 9 ☐ Training or experience received on previous job 8490 10 ☐ Sheltered workshop 8492 11 ☐ Vocational rehabilitation centers 8494 12 ☐ Other
e. Does ... use this training on ...'s (most recent) job?	8496 1 ☐ Yes 2 ☐ No
f. When did ... start this (most recent) training? (If more than one training occurred, ask about the most recent one.)	8498 Month x1 ☐ Don't know 8500 1 9 Year x1 ☐ Don't know
g. For how many weeks did ... attend this (most recent) training program?	8502 Weeks 8504 x3 ☐ Currently attending x4 ☐ Less than 1 week x1 ☐ Don't know
h. Who paid for this (most recent) program? Mark (X) all that apply.	8508 1 ☐ Self or family 8508 2 ☐ Employer 8510 3 ☐ Federal, State, or local government 8512 4 ☐ Someone else
Go to Check Item T34, page 65	
NOTES	

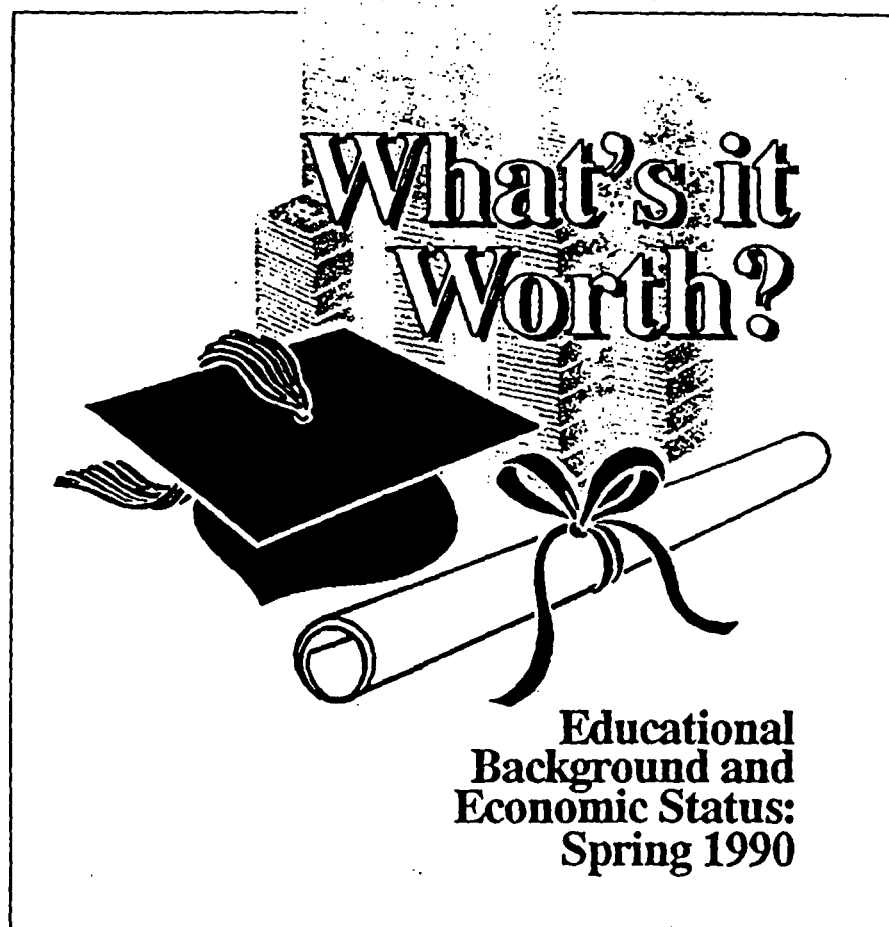
CARD FF
WAVE 2, 1990 PANEL
MAJOR FIELD OF STUDY

Code	Major Field
01	— Agriculture or Forestry
02	— Biology
03	— Business or Management
04	— Economics
05	— Education
06	— Engineering (including computers and computing)
07	— English or Journalism
08	— Home Economics
09	— Law
10	— Liberal Arts or Humanities (include arts, architecture, music, languages, philosophy, etc.)
11	— Mathematics or Statistics
12	— Medicine or Dentistry
13	— Nursing, Pharmacy, or Health Technologies
14	— Physical or Earth Sciences
15	— Police Science or Law Enforcement
16	— Psychology
17	— Religion or Theology
18	— Social Sciences (history, sociology, political science, etc.)
19	— Vocational or Technical Studies
20	— Other



CURRENT POPULATION REPORTS
Household Economic Studies

P70-32
Issued December 1992



by Robert Kominski and
 Rebecca Sutterlin



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Economics and Statistics Administration
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BUREAU OF THE CENSUS
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Table A. **Average Monthly Earnings by Educational Level, Sex, and Race: Spring 1987 (Adjusted) and Spring 1990**

Educational attainment	1990 earnings		1987 earnings		
	Mean	Standard error	Original mean	Adjusted mean ¹	Adjusted standard error
TOTAL, 18 YEARS AND OVER					
Both sexes.....	² \$1,284	\$15	\$1,075	\$1,237	\$15
Doctorate.....	3,855	304	3,637	4,184	597
Professional.....	4,981	455	4,003	4,606	396
Master's.....	2,822	202	2,378	2,736	78
→ Bachelor's.....	2,116	41	1,829	2,104	44
Associate.....	1,872	51	1,458	1,677	58
Vocational.....	1,237	50	1,088	1,252	70
→ Some college, no degree.....	1,280	31	1,088	1,252	25
→ High school graduate only.....	1,077	16	921	1,060	15
→ Not a high school graduate.....	492	12	452	520	16
Male, 18 years and over.....	1,792	24	1,540	1,771	27
Female, 18 years and over.....	² \$19	17	652	750	11
White, 18 years and over.....	² 1,334	18	1,116	1,283	16
Black, 18 years and over.....	894	28	768	881	28

¹1987 dollars adjusted to 1990 using an inflation factor of 1.15 derived from the Consumer Price Index (CPI-U-X1 series).

²Indicates 1990 amount is significantly greater than 1987 amount.

Some fields are clearly associated with one or two degree types - law and medicine with doctorate/professional degrees, for example; while others such as business and education are represented at several different degree levels.

Different degrees are also associated with one or two fields. For instance, about 56 percent of all professional/doctorate degrees were in just two fields: law and medicine/dentistry. Around 31 percent of all master's degrees were in education with an additional 17 percent in business/management; these same two fields represent a large proportion of those with bachelor's degrees. Business/management pairs up with nursing/pharmacy/technical health to make up about 38 percent of all associate degrees; while the majority of all vocational degrees were in nursing/pharmacy/technical health and vo-tech studies (63 percent). Overall, the largest single field was business which accounted for 1 in 5 degrees.

There are several notable differences between the sexes with respect to degree fields. While 23 percent of men with degrees held them in business/management, only 15 percent of women held their degree in this field. Approximately 15 percent of men held an engineering degree, but just 2 percent of women with a degree were in this field. A large share of women's degrees were in other fields: 21 percent in education and 16 percent in nursing/pharmacy/technical health. In contrast, these same fields accounted for only 7 percent (in education) and 2 percent (in nursing/pharmacy/technical health) of degrees held by men. In general, these patterns are very similar to those found in 1984 and 1987.

FIELDS OF STUDY AND ECONOMIC STATUS

Each year, many college students are faced with one of the most difficult decisions in college — the choice of a major. For some students, the choice reflects a pattern of interest that has developed over time; for others, the choice may be motivated by other factors. One factor which enters into the choice of field of study for many students is the perceived economic rewards that may accrue from a degree in a chosen field. To a large extent, ultimate financial rewards may result more from the skills of the individual, the specific job they take, and the relative demand for the type of position they occupy. Nevertheless, one's field of training has some bearing on these factors and consequently on eventual economic outcomes. Table 4 shows the summary economic measures previously discussed by various fields and types of degrees. Because the SIPP is a sample survey, there are not always enough sample cases to provide statistically reliable estimates of every field and degree combination. The panels of table 4 have been chosen to produce tables where most cells have an estimated base of at least 200,000 persons.

The first panel of table 4 shows the average monthly income, earnings, and work activity by field for all persons age 18 and above with a degree beyond high school (average monthly income, earnings, and work activity are defined as those in table 2). Variations specific to degree levels are not controlled in these data, but field-specific variations are still evident. Degrees in the fields of law and medicine/dentistry are associated with the highest average monthly earnings, while

EDUCATION DAILY

The education community's independent daily news service

With This Issue:
Analysis Of Chapter 1/Title I Law.
See Special Supplement.

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High Court Accepts Student Drug Testing Case

The U.S. Supreme Court agreed yesterday to consider the legality of random drug testing for public school athletes.

Without comment, the justices opted to hear arguments in *Vernonia School District 47J v. Acton* (94-590), an Oregon school district's attempt to resurrect its drug testing program.

Earlier this year, the U.S. Ninth Circuit Court of Appeals struck down Vernonia's program as an overly broad intrusion on student privacy rights (ED, May 9).

A ruling in *Acton* would mark the Court's first guidance in this area of school law since 1985, when it upheld a school official's search of a student's purse in *New Jersey v. TLO* (469 U.S. 325).

College Questions, Too

The decision could affect drug testing not only in secondary school athletics, but also in college-level sports, another area where disputes have arisen.

Earlier this year, the justices turned down the University of Colorado's request to review a state court decision that ordered the dismantling of the university's random urine testing program for athletes (ED, May 3).

"This case will then decide once and for all whether we have [random testing] authority and whether extracurricular activities can be treated differently" than regular school attendance for testing purposes, August Steinhilber,
(more)

In This Issue

Comments Show Consensus
On Matching FEL, DSL Rules Page 3

Funding Alert Page 4

Long-Term Value Of Education Increasing, Census Bureau Says

The magnifying power education has on earnings grew stronger over the past 17 years, a new Census Bureau report says.

Working adults older than 17 earned an average of \$12,809 in 1992 if they were high school dropouts, compared to \$74,560 for doctors, lawyers and others with professional degrees (see chart, p. 3).

High school graduates earned an average of \$18,737, and adults overall had mean earnings of \$23,227, Census says.

In 1975, high school dropouts earned an average of \$6,014 and graduates \$7,536.

But when it adjusts earnings for inflation, Census calculates that dropouts lost ground since 1975 while graduates held steady.

Earnings of adults with advanced degrees gained ground, tripling during the time period, from \$15,619 to \$48,653.

"If these patterns continue, lifetime earnings
(more on p. 3)

Long-Term Value Of Education Increasing (Cont. from p. 1)

differences between low and high levels of education will become even more dramatic than current levels indicate," the report says.

Over their lifetime, high school dropouts would earn an average of \$600,000 in 1992 dollars, about \$200,000 less than those who hold a diploma, Census estimates.

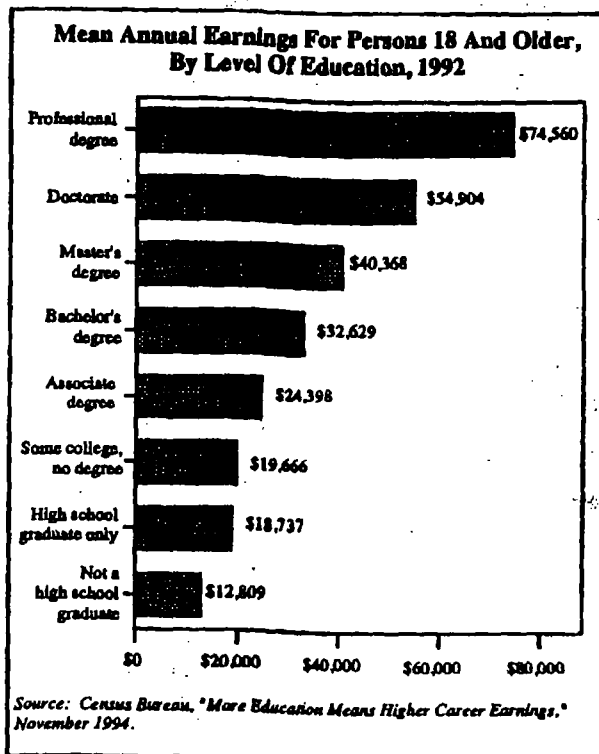
Adult workers who went to college but did not receive a degree could expect lifetime earnings of nearly \$1 million, and a bachelor's degree would be worth another \$500,000, according to Census.

Doctorate and professional degrees are worth an estimated \$2 million and \$3 million, respectively, over an adult's working life.

In 1993, Census says, four-fifths of adults older than 24 had graduated from high school.

"More Education Means Higher Career Earnings" is free by calling Census Bureau, Customer Services Department, (301)763-4100.

—Khela Cuccaro



Comments Show Consensus On Matching FEL, Direct Lending Rules

Lenders and guarantors generally approve of the Education Department's plan to square Family Education Loan (FEL) program rules with those for direct lending.

After calling for comment last month, ED received only 19 responses, most from lending groups pleased with the move to square the programs' regulations, even when it results in stricter FEL rules.

ED has been pushing the new Direct Student Loan (DSL) program as the more viable loan program, with the department making loans through postsecondary schools, but FEL proponents are looking for a chance to prove their program's merits.

FEL can compete with DSL only if the two loan programs operate on a level playing field, say FEL supporters.

Most of the required changes ED plans to make remove roadblocks to students procuring

congressional Advisory Committee on Student Financial Assistance, said in an interview last week.

The 1993 Student Loan Reform Act, which authorized DSL, mandates the revision.

Brining FEL In Line

Highlights in the proposed FEL rules include:

- Requiring a lender to provide information about the loan application process and about consolidating FEL and other loans.

Many lending groups supported the effort to keep borrowers enlightened, despite the burden of providing information.

But some, including the National Council of Higher Education Loan Programs (NCHELP), recommended an equally stringent DSL rule.

- Letting a lender make late disbursements more than 60 days after a student ends

Bureau of the Census

Statistical Brief

More Education Means Higher Career Earnings

Is it worth it to stay in school and earn a higher degree? As data from the Census Bureau's Current Population Survey show, the answer is a resounding yes!

This Brief examines the relationship between education and earnings during the 1992 calendar year; it also demonstrates how the relationship has changed over the last two decades. Additionally, it provides estimates (by level of education) of the total earnings adults are likely to accumulate over the course of their working life.

You'll see that more education means greater earnings over a year's time; over the length of one's working life, these differences become enormous. Moreover, this relationship between earnings and education is now even stronger than it was back in the 1970's.

We're more educated than ever.

In 1993, about four-fifths of American adults aged 25 and over had at least completed high school; over one in five had a Bachelor's degree or higher. Both figures are all-time highs.



SB/94-17
Issued August 1994

U.S. Department of Commerce
Economics and Statistics Administration
BUREAU OF THE CENSUS

Professional degree holders have the highest earnings.

Adults aged 18 and over who worked sometime during 1992 earned an average of \$23,227 that year. But this average masked the fact that the more education they received, the more money they made. (See graph below.) Earnings ranged from \$12,809 for high school dropouts to \$74,560 for those with professional degrees (such as M.D.'s and J.D.'s).

Earnings differences compound over one's lifetime.

Using 1992 data, we estimated the earnings a person would accrue over a typical "worklife." Here's

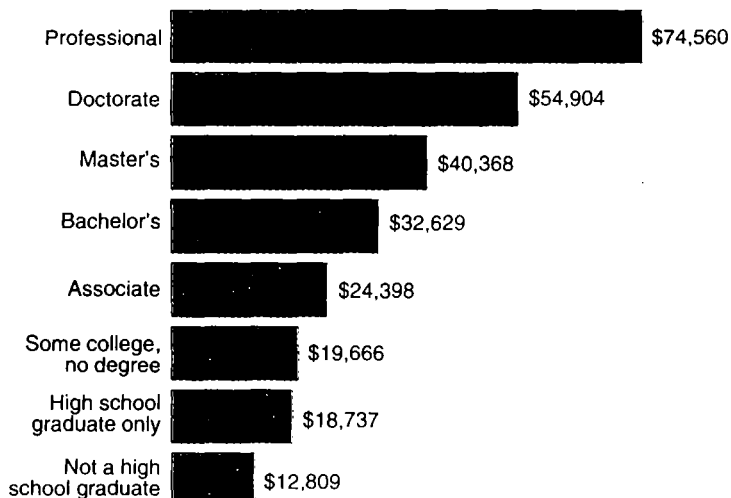
how we did it. First, we defined a worklife as lasting from ages 25 to 64 — a 40-year period. Then we began our calculations.

We started with high school dropouts. We took the 1992 mean earnings figure for persons of this group who were aged 25 to 34 and multiplied it by 10. The same thing was done for those aged 35-44, 45-54, and 55-64. Then, the four 10-year totals were added up. The result was an estimated lifetime earnings total for high school dropouts. This process was then repeated for each of the other seven educational levels.

These estimates dramatically illustrate the large earnings differences

Education Continues to be the Ticket to Higher Earnings

Mean annual earnings for persons aged 18
and over, by level of education: 1992



that develop between educational levels over the long term. As the graph below shows —

- High school dropouts would make (in 1992 dollars) around \$600,000 during their lifetime.
- Completing high school would mean about another \$200,000.
- Persons who attended some college (but did not earn a degree) might expect lifetime earnings in the \$1 million range.
- You could tack on nearly another one-half million dollars for holders of a Bachelor's degree.
- Doctorate and professional degree holders would do even better, at just over \$2 million and \$3 million, respectively.

Lifetime differences may become even more striking in the future.

These estimates of lifetime earnings assume that 1992 earnings levels will stay in effect throughout one's worklife. But the reality is that the value of the dollar continually changes. And recent history shows that the value of higher levels of education has risen faster than that of lower levels. When we compare 1975 and 1992 figures, we see that average earnings —

- Doubled for high school dropouts (from \$6,014 to \$12,809).
- Rose 2.5 times for those who were high school graduates only (from \$7,536 to \$18,737).
- Nearly tripled for holders of Bachelor's degrees (from \$11,574 to \$32,629).
- Tripled for those who held advanced degrees (from \$15,619 to \$48,653).

Keep in mind that in 1992 the consumer price index (which measures yearly changes in the value of the dollar) was 140, 2.5 times what it was in 1975. This means that the earnings of high school dropouts did not even keep up with infla-

tion, and high school graduates just barely managed to keep pace. Real wages rose only for persons with education beyond the high school level. If these patterns continue, lifetime earnings differences between low and high levels of education will become even more dramatic than current levels indicate.

More information:

Several Census Bureau reports have information on the relationship between earnings and education. These include —

■ *Educational Attainment in the United States: March 1993 and 1992*, Current Population Reports, Series P20-476. Stock No. 803-005-00077-0. \$8.50.

■ *What's It Worth? Educational Background and Economic Status: Spring 1990*, Current Population Reports, Series P70-32. Stock No. 803-044-00020-1. \$3.50.

■ *Money Income of Households, Families, and Persons in the United States: 1992*, Current Population Reports, Series P60-184. Stock No. 803-005-30031-5. \$19.

■ *Education in the United States*, Series 1990, CP-3-4. Stock No. 003-024-08742-1. \$41.

To order any of these publications, call the U.S. Government Printing Office (202-512-1800).

Contacts:

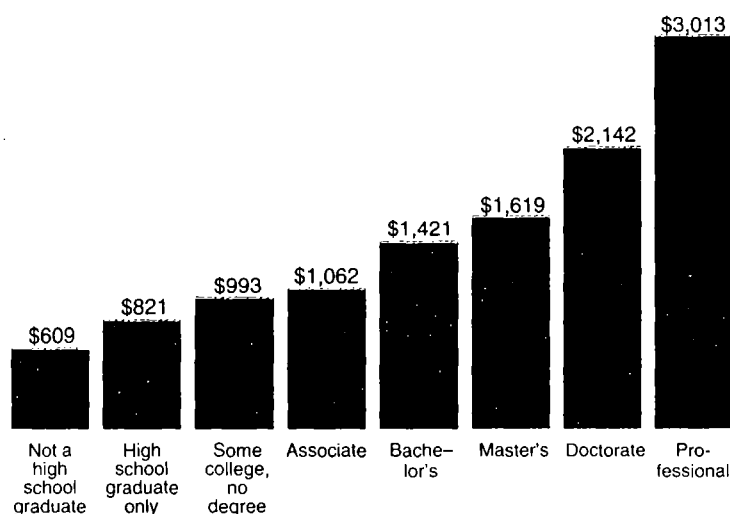
Earnings and education —
Robert Kominski
301-763-1154

Statistical Briefs —
Robert Bernstein
301-763-1584

This Brief is one of a series that presents information of current policy interest. It may include data from businesses, households, or other sources. All statistics are subject to sampling variability, as well as survey design flaws, respondent classification errors, and data processing mistakes. The Census Bureau has taken steps to minimize errors, and analytical statements have been tested and meet statistical standards. However, because of methodological differences, use caution when comparing these data with data from other sources.

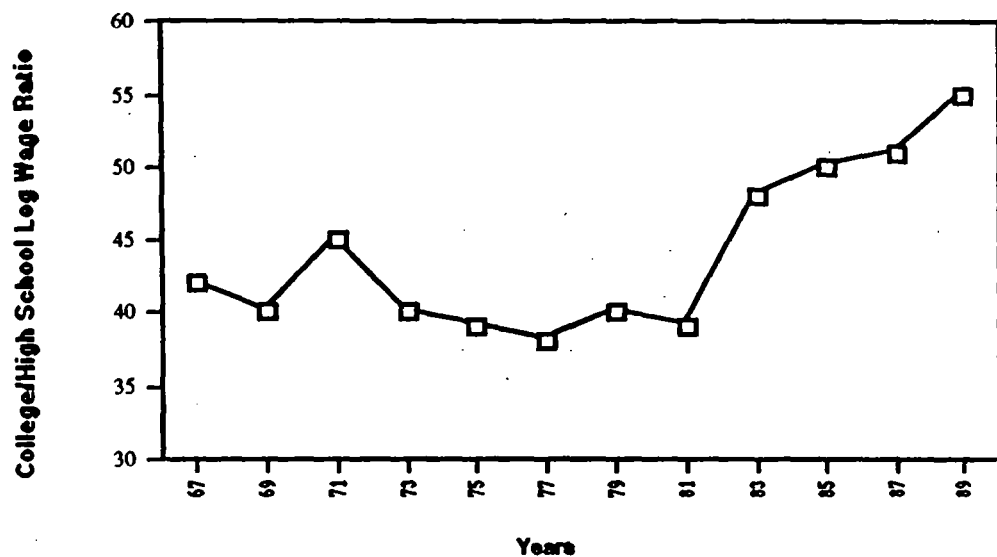
Go to College, Make a \$Million

Estimates of worklife earnings, by level of education: 1992
(In thousands of dollars)



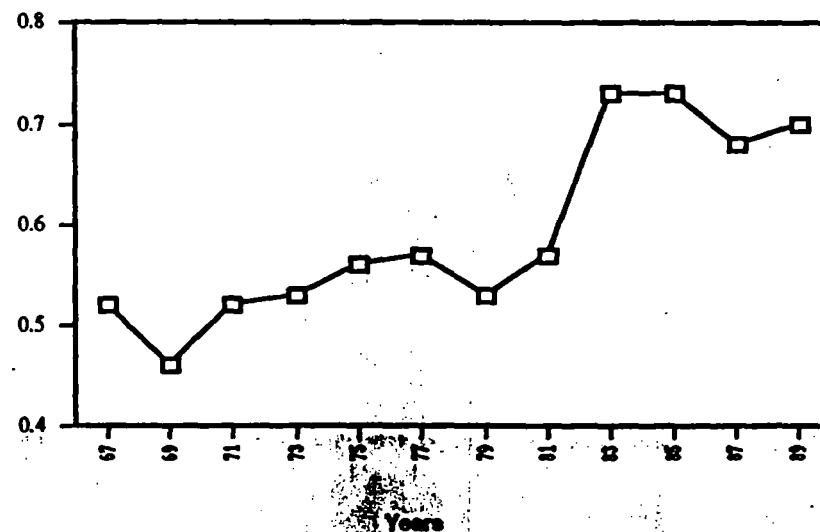
**Figure 4. US Hourly Wage Changes
1967-1989**

**Returns to College for Males. All New Entrants
all experience levels**



**Figure 5. US Hourly Wage Changes
Returns to experience for
High School Males 1967-89**

Log Wage Ratio: 26-35/1-3 years of Experience



Source: Katz, Loveman, and Blanchflower (1993). "A comparison of changes in the structure of wages in four OECD countries." NBER Working Paper No. 4297

NATIONAL CENTER FOR EDUCATION STATISTICS

**THE CONDITION
OF EDUCATION
1994**

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U.S. Department of Education
Office of Educational Research and Improvement

NCES 94-149

**THE CONDITION
OF EDUCATION
1994**

Annual earnings of young adults

- ▶ In 1992, the median annual earnings of whites, both male and female, who had not completed high school were about 75 percent of the earnings of whites who had completed high school. The earnings ratio between black graduates and dropouts was about 67 percent.
- ▶ Since 1970, the earnings advantage of college graduates was generally greater for females than for males; that is, the percentage difference between earnings of college graduates and high school graduates was greater for females than for males.
- ▶ The earnings advantage of completing college increased between 1974 and 1992 for males and females, both white and black.
- ▶ The earnings advantage of having a bachelor's degree was more than double the earnings advantage of having attended only some college in 1992. For example, among white female workers 25–34 years old, the earnings of college graduates were 94 percent greater than those of high school graduates, and the earnings of those with some college were 32 percent greater than those of high school graduates (see supplemental table 34-2).

Wages and salaries are influenced by many factors, including the employer's perception of the productivity and the availability of workers with different levels of education. They are also affected by economic conditions in the industries that typically employ workers with different levels of education. Annual earnings are influenced by the number of weeks worked in a year and the usual hours worked each week. The ratio of annual earnings of high school dropouts or college graduates to those of high school graduates is affected by all these factors; it is a measure of the earnings disadvantage of not finishing high school and the advantage of completing college.

Ratio of median annual earnings of wage and salary workers 25 to 34 years old with 9–11 and 16 or more years of school to those with 12 years of school, by sex and race/ethnicity: Selected years 1970–92

Year	9–11 years of school				16 or more years of school			
	Male		Female		Male		Female	
	White	Black	White	Black	White	Black	White	Black
1970	0.87	0.78	0.60	0.52	1.21	(¹)	1.81	2.08
1972	0.85	0.75	0.56	0.79	1.16	1.43	1.74	2.03
1974	0.85	0.75	0.60	0.62	1.14	1.11	1.77	1.69
1976	0.80	0.80	0.57	0.58	1.16	1.47	1.61	1.59
1978	0.79	0.74	0.56	0.48	1.13	1.46	1.58	1.39
1980	0.77	0.76	0.61	0.72	1.16	1.35	1.50	1.64
1982	0.72	0.77	0.64	0.69	1.30	1.51	1.63	1.65
1984	0.62	0.65	0.57	0.53	1.30	1.64	1.61	1.69
1986	0.69	0.87	0.62	0.78	1.43	1.69	1.75	1.96
1987	0.74	0.86	0.72	0.55	1.43	1.49	1.74	1.92
1988	0.73	0.56	0.51	0.62	1.42	1.37	1.78	1.93
1989	0.74	0.61	0.64	0.50	1.44	1.41	1.89	2.05
1990	0.73	0.72	0.56	0.44	1.42	1.66	1.89	2.09
1991	0.70	0.68	0.62	0.56	1.46	1.53	1.88	1.97
1992 ²	0.73	0.65	0.77	0.68	1.55	1.83	1.94	2.13

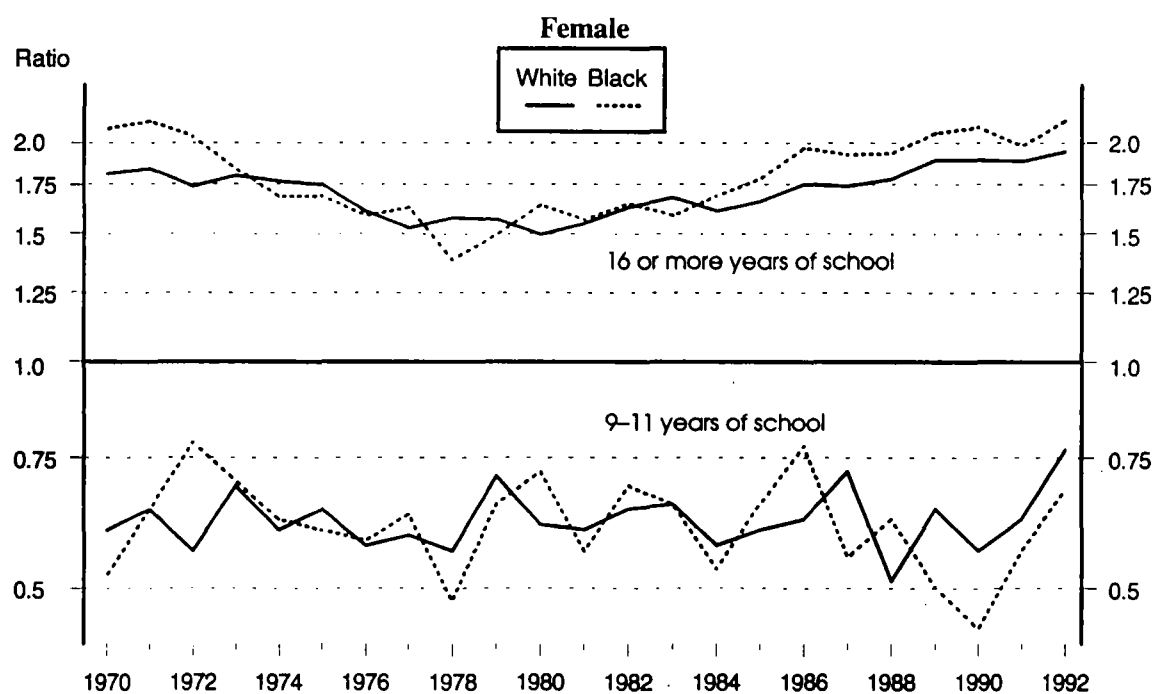
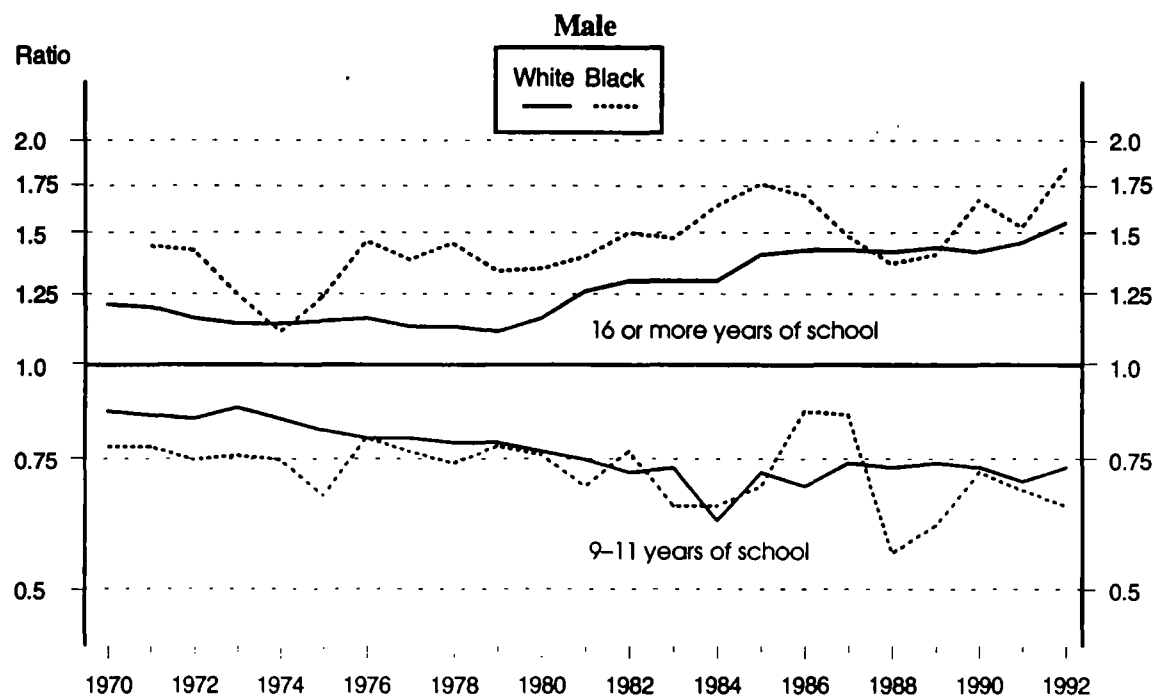
¹Too few sample observations for a reliable estimate.

²Beginning in 1992, the Current Population Survey changed the questions used to obtain the educational attainment of respondents. See the supplemental note to Indicator 21 for further discussion.

NOTE: This ratio is most usefully compared to 1.0. For example, the ratio of 1.55 in 1992 for white males with 16 or more years of school means that they earned 55 percent more than white males with 12 years of school. The ratio of .65 in 1992 for black males with 9–11 years of school means that they earned 35 percent less than black males with 12 years of school.

SOURCE: U.S. Department of Commerce, Bureau of the Census, March Current Population Surveys.

Ratio of median annual earnings of wage and salary workers 25 to 34 years old with 9-11 and 16 or more years of school to those with 12 years of school, by sex and race/ethnicity: 1970-92



NOTE: One (1.0) on the scale represents earnings equal to those with 12 years of school; 2.0 represents double their earnings. 0.5 represents half their earnings. The scale on the graph makes the distance between 1.0 and 2.0, or doubling, the same as between 1.0 and 0.5 or halving.

SOURCE: U.S. Department of Commerce, Bureau of the Census, March Current Population Surveys.

The OECD JOBS STUDY

Facts

Analysis

Strategies

1950 1952 1954 1956 1958 1960 1962 1964 1966 1968 1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992

UNEMPLOYMENT IN THE OECD AREA, 1950-1992

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Pursuant to Article 1 of the Convention signed in Paris on 14th December 1960, and which came into force on 30th September 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

- to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;
- to contribute to sound economic expansion in Member as well as non-member countries in the process of economic development; and
- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The original Member countries of the OECD are Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The following countries became Members subsequently through accession at the dates indicated hereafter: Japan (28th April 1964), Finland (28th January 1969), Australia (7th June 1971), New Zealand (29th May 1973) and Mexico (18th May 1994). The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

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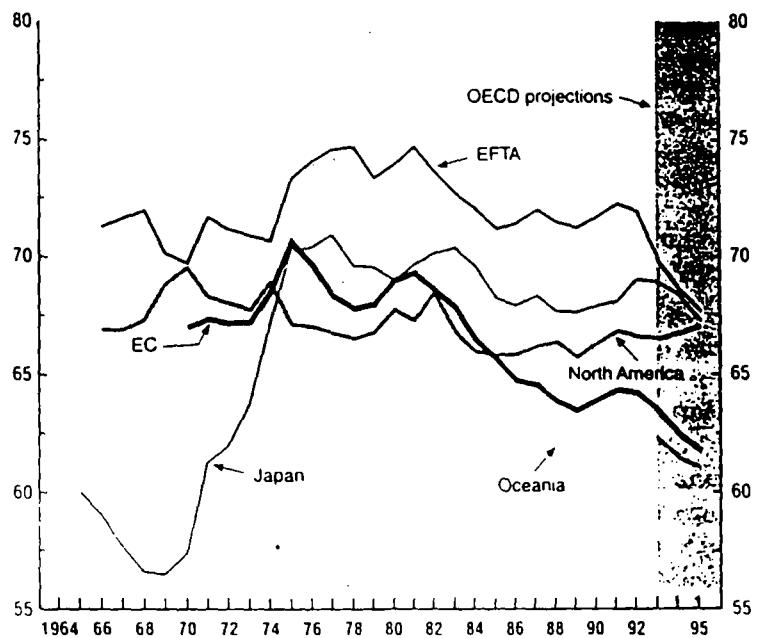
Head of Publications Service, OECD
2, rue André-Pascal, 75775 PARIS CEDEX 16, France

WAGES: THE LINK BETWEEN PEOPLE AND JOBS

Chart 13. Wage shares in OECD regions¹
1964-95
Per cent

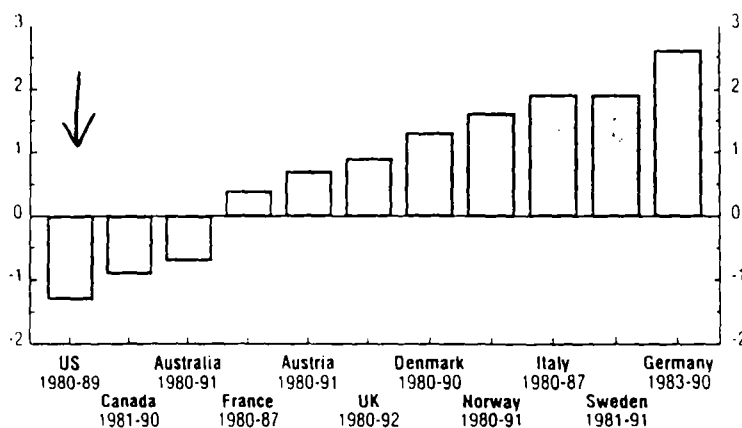
One of the main mechanisms that matches people and jobs is wage adjustment. Wages have significant consequences for employment and unemployment. The process of wage determination is strongly influenced by labour market pressures, social perceptions, legislation, and industrial relation systems, which all affect the evolution of real wages (nominal wages adjusted for price increases) and wage differentials.

Across the OECD area growth of real wages moderated after the 1979 oil-price shock in an environment of tight macroeconomic policies that reduced inflation to the low rates of the 1960s. Wage shares in national income generally fell back to, or even below, their early 1970s levels. The ensuing improvement in profits much enhanced the business investment climate.



1. The share of labour income (including an imputation for the self-employed) in business sector output.

Chart 14. Growth in real wages of low-paid workers¹
Annualised percentage change



1. Low-paid workers correspond to workers in the 10th percentile of the overall earnings distribution for males (both sexes in Norway and Denmark). Gross earnings have been deflated by the consumer price index.

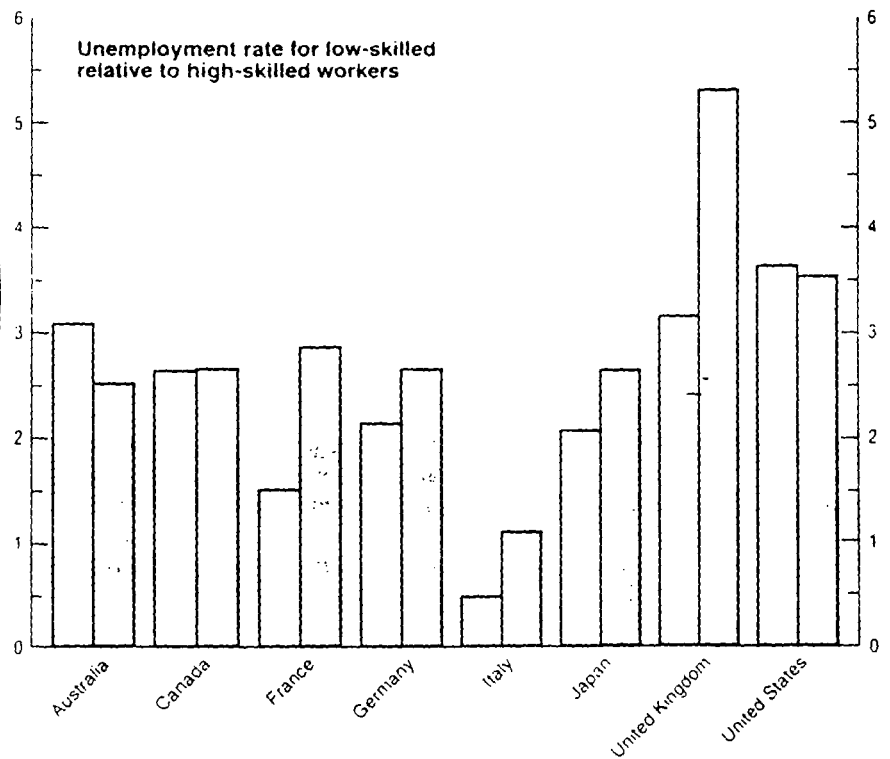
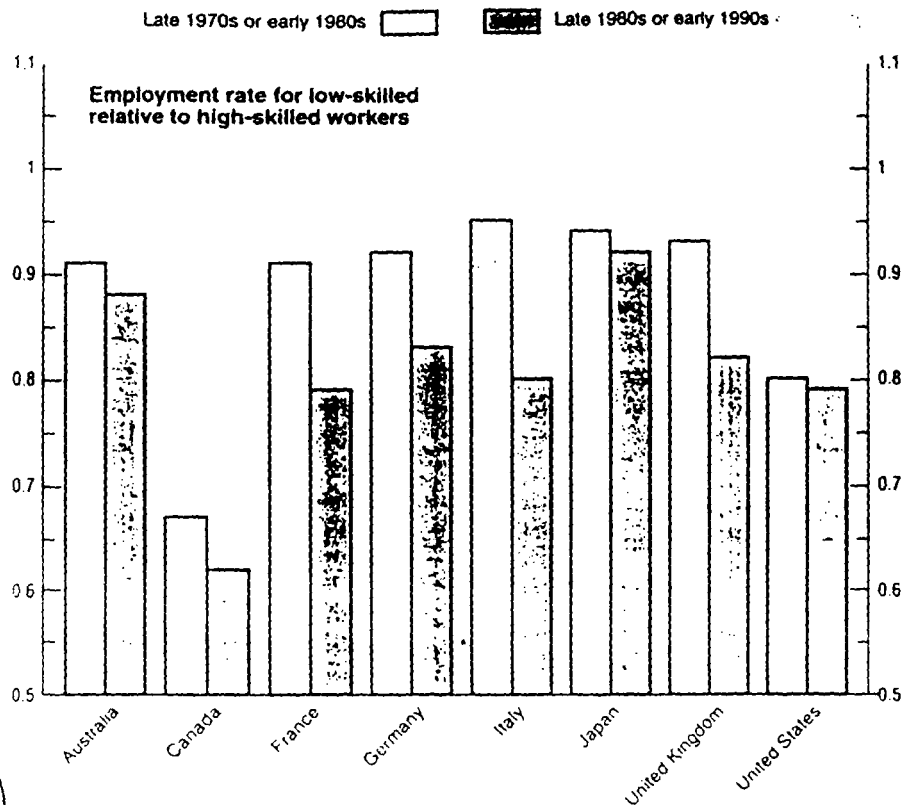
At the same time as overall wage shares fell, there were contrasting trends in the dispersion of wages, between low-skilled and high-skilled workers. In the English-speaking countries, wage differentials widened over the 1980s. In the continental European countries on the other hand, wage differentials were either broadly unchanged, or increased only slightly after narrowing in earlier decades.

The widening of wage differentials was associated with actual falls of real wages for low-skilled male workers in Australia, Canada and, especially, in the United States. The United Kingdom, however, experienced both a sharp increase in earnings inequality and increases in real wages of the low-skilled, because of rapid growth of wages in general during the 1980s.

Chart 15. Employment and unemployment rate differentials by skill¹

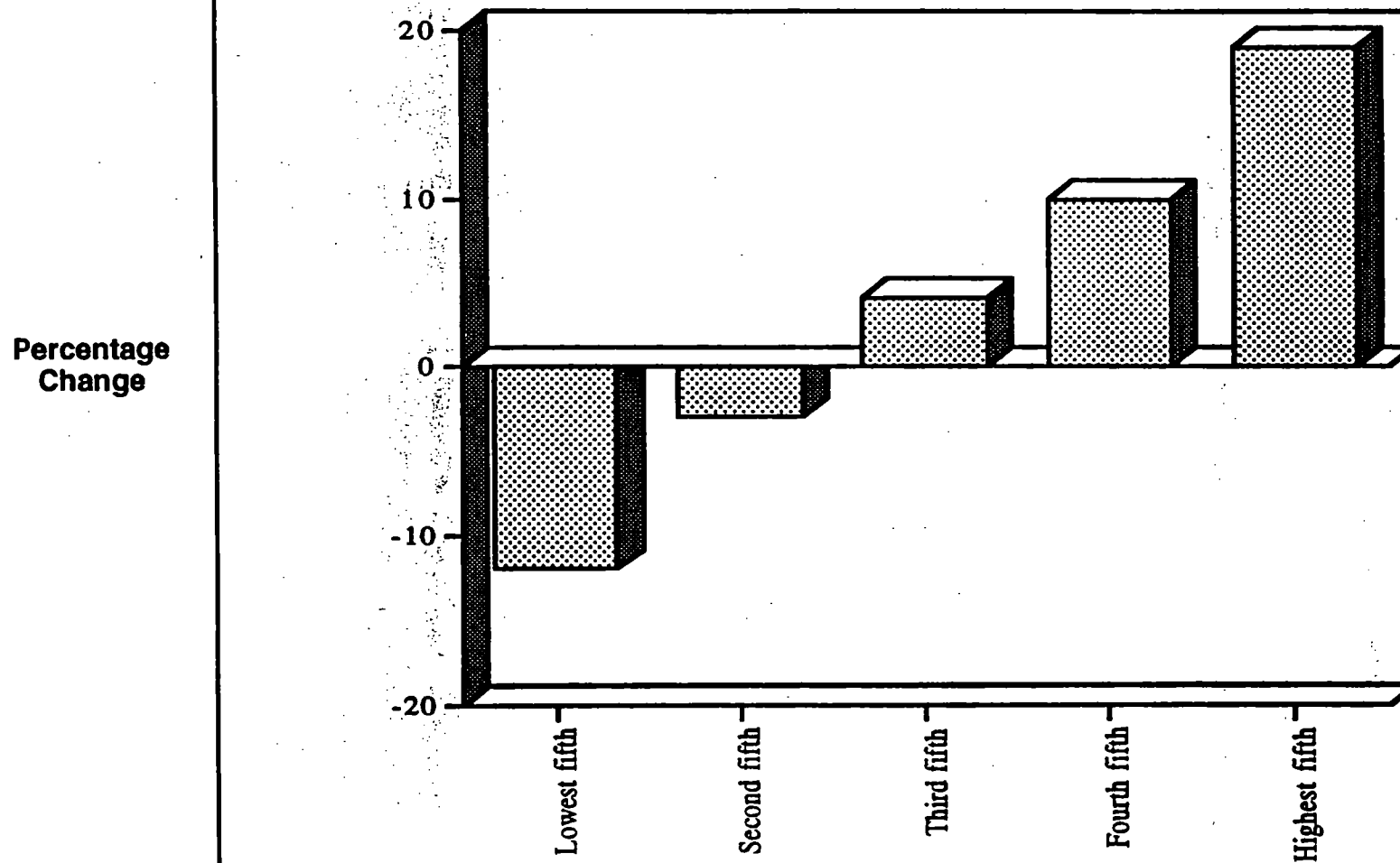
The United States has a much higher incidence of low pay than most other OECD countries. Over one-quarter of all full-time workers in the United States earn less than two-thirds of median earnings, compared with between one-tenth in Australia and one-fifth in the European Community. In 1990 nearly one-fifth of all full-time workers in the United States had earnings at or below the official poverty level for a four-person family (although only around 6 per cent were living in families whose total income fell below the poverty line).

All countries have experienced a shift in demand away from unskilled jobs towards more highly skilled jobs. In most countries where relative wages have been flexible (the United States, Canada, Australia), both the relative employment and unemployment rates of the unskilled changed little during the 1980s. In comparatively inflexible Europe, on the other hand, both relative employment and unemployment rates deteriorated.



¹ The adult male employment (unemployment) rate for the bottom quartile of the population (labour force) ranked by educational qualifications divided by the rate for the top quartile.

**Figure 9. Growth in Real Median Family Income
(1973-1992)**



Source: Bureau of the Census

from NEC