College appeals to more people than ever before. What awaits these graduates? Will the workplace pay?

College at work:

Outlook and earnings for college graduates, 2000-10

by Arlene Dohm and Ian Wyatt

When it comes to work, having a college degree is one of the best ways to gain and maintain a competitive edge. On average, college graduates enjoy advantages—ranging from more job opportunities to better salaries—over their non-college-educated counterparts.

A college degree does not guarantee that workers will find their dream job, but it does help prepare them for career pursuits. And the goal of career preparation is at least part of the reason that more than 1 million students earned their bachelor's degrees in 2000.

What are the job prospects for these college graduates? This article considers that question by presenting an overview of the 2000-10 job market for college graduates. The first section examines education and employment data, reasons for attending college, and earnings data. The second section describes the background for the Bureau of Labor Statistics (BLS) publication of the outlook for college graduates, including information about why this article differs markedly from those of years past; projects the number of job openings in occupations that employ the largest numbers of college graduates; and compares growth in these jobs with the projected average employment growth for all occupations. A final section points up sources for further research.

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For purposes of this article, the term "college degree" refers to any bachelor's or higher degree: master's, including master of business administration; professional, such as law; and doctor of philosophy, or Ph.D. Data are examined by workers' highest levels of educational attainment—from high school diploma to Ph.D.

College in career planning

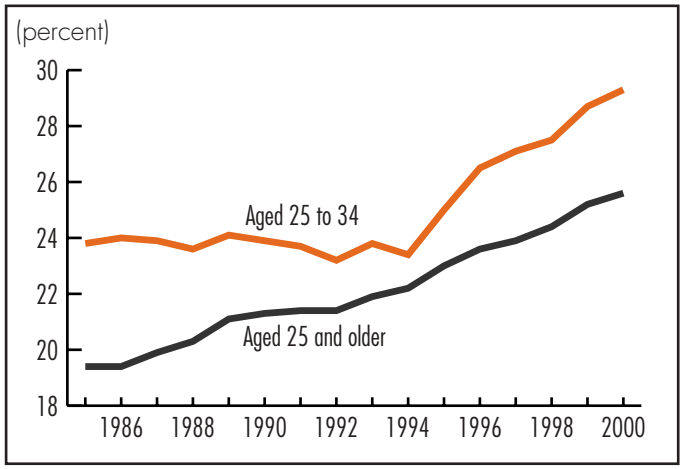
People attend college for many reasons. Some of those reasons are personal—the quest for self-improvement, perhaps—while others are universal, tied to a desire to enter occupations in which a college degree may be preferred or even required for workers. Although it is impossible to discern each student's motivation for going to college, one thing is certain: more individuals are earning their degrees. And as a career-planning tool, those degrees have some quantifiable benefits, the most measurable of which are earnings.

More people have college degrees

Over the last several decades, there has been an increase in the proportion of people earning a degree. This increase is particularly striking in recent years for those aged 25 to 34. (See chart 1.) Overall for people in this age group, Census Bureau data show that the proportion completing 4 or more years of college grew from 23 percent in 1992 to 29 percent in 2000. College-educated workers are even more prevalent.

Chart 1

Population completing 4 or more years of college, 1985-2000



Data show that during that same 8-year period, the proportion of the workforce with college degrees increased from 25 percent to 28 percent. Among workers 25 to 34 years old, the proportion rose from 26 percent to 33 percent. A base year of 1992 is used because it was the first year in which the Current Population Survey collected educational attainment data based on the highest degree earned; prior to 1992, educational attainment data reflected only the number of years of schooling completed.

Within the college-educated workforce, immigrants are a significant presence. In 2000, foreign-born college graduates made up 12 percent of the college-graduate labor force. Current Population Survey data show that among immigrants aged 25 to 34 who entered this country between 1996 and 2000 and are in the labor force, 38 percent have a college degree, including 16 percent with an advanced degree. In contrast, 32 percent of U.S.-born workers aged 25 to 34 have a college degree, including 7 percent with an advanced degree.

At any given time, a portion of college graduates is unavailable to fill jobs. These college graduates—ones who are neither working nor looking for work—are, by definition, not in the labor force. In 2000, the civilian labor force participation rate of individuals aged 25 to 34 with a college degree was 89 percent—which means another 11 percent of college graduates in that age group were not in the labor force. Some go to graduate school without taking a supplemental job. Others stay home to raise a family. Still others enter the military. For most college graduates, their time out of the labor force is usually temporary; most will work for much of their lives.

Benefits of a college degree

For most people, pursuing a college degree is both time consuming and expensive. But in the end, college graduates usually see a return on their investments of time and money. Students working toward a degree are likely to set their sights on the long-term payoffs—which include more career options, better promotion opportunities, higher earnings, and lower unemployment—that a college education provides.

More career options. Many occupations may be classified as "college preferred"—that is, a college degree is helpful, but not mandatory, in obtaining the job. But there are a number of occupations that only a college graduate can hold. Some may require several years of additional education beyond a bachelor's degree, leading to a graduate or professional degree, and a license to practice. Among the largest of these are health diagnosing and treating occupations, including physicians, dentists, and veterinarians; teachers and faculty; and lawyers.

College-preferred occupations do not necessarily specify a preference for field of study. As a result, college graduates' career options include entering occupations unrelated to their major. A 1997 survey by the U.S. Department of Education's National Center for Education Statistics found that, 4 years after obtaining a bachelor's degree, 55 percent of graduates were in jobs related to their major field of study. Social sciences majors had the lowest proportion, 33 percent, of jobs related to their field of study. In contrast, 82 percent of those who majored in the rapidly growing health-related fields held jobs related to their major. (For more information on the survey, see "Four years after graduation: The class of 1993," in the Winter 2000-01 *Occupational Outlook Quarterly*, also available online at **www.bls.gov/opub/ooq/2000/winter/art02.pdf**.)

Better promotion opportunities. Job promotions usually are based on workers' motivation, quality of work, and ability to get along with others. But supervisors often interpret having a college degree as a sign that workers are serious about the job, know how to learn, and can achieve goals. Supervisors considering candidates for promotion may look more favorably upon those who have a college degree than on those who do not have one. For example, in 2000, 24 percent of supervisors in administrative support and clerical occupations had a college degree, even though college graduates are only 14 percent of the workers in this occupational group as a whole. Similarly, 32 percent of supervisory police and detectives in 2000 held a college degree, despite college graduates being 21 percent of nonsupervisory police and detectives.

Higher earnings. The ability to earn a high salary over a

lifetime is one of the most compelling reasons to earn a degree. Among the top 25 percent of full-time wage and salary earners in 2000, 58 percent had a college degree. The median weekly earnings of workers aged 25 to 64 with a bachelor's degree was $834, compared with $507 for workers whose highest level of educational attainment was a high school diploma or equivalent. Earnings increased for those with advanced degrees. But not all college graduates earn high salaries; in fact, 17 percent of these bachelor's degree holders earned less than the median for all high school graduates in 2000. Nevertheless, data show that most college graduates earn more than workers whose highest level of educational attainment is a high school diploma.

The following tabulation shows the 2000 median weekly earnings of workers aged 25 to 64 by highest level of educational attainment and the proportions of those workers who earned less than the median for high school graduates:

Education level	*Median weekly earnings, 2000*	*Percent who earned less than the median for high school graduates*
High school diploma or equivalent	$507	–
Bachelor's degree	834	17
Master's degree	983	10
Professional degree	1,174	9
Doctoral degree	1,214	6

The link between earnings and education is discussed in more detail below, in the section "Earnings: Higher by degree." (And for a look at the increase in estimated lifetime earnings by educational attainment, see the OOChart in this issue of the *Quarterly*.)

Lower unemployment. The chances of having a job are better for those with a college degree than for those without one—and the unemployment rate is lower for those with more education. As chart 2 shows, the unemployment rate in 2000 was 3.5 percent for workers aged 25 and over whose highest level of educational attainment was a high school diploma, compared with less than 1 percent for those who had either a professional or doctoral degree.

Earnings: Higher by degree

Earnings are an indicator of the demand for college graduates because wages tend to increase fastest for workers in greatest demand. And between 1992 and 2000, real earnings—median earnings adjusted for inflation—rose 6 percent for full-time wage and salary workers aged 25 to 64 with a bachelor's degree. In contrast, real earnings increased only 2 percent for their counterparts whose highest level of educational attainment was a high school diploma. More remarkably, wages increased despite a 33-percent increase in the number of college graduates aged 25 to 64 and working full time, far surpassing the 4-percent increase in the number of workers with a high school diploma.

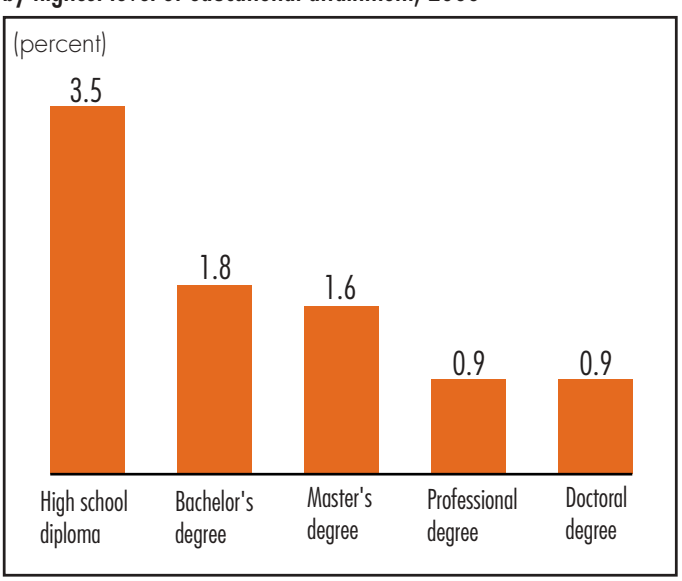
At the same time, however, wage increases became less evenly distributed among college graduates. The difference in real weekly earnings between the lowest earning (10th percentile) bachelor's degree holders and the highest (90th percentile) increased from $1,075 in 1992 to $1,297 in 2000—that translates to nearly $11,500 annually. (See chart 3.) Bachelor's degreeholders in the top 10 percent earned 16 percent more in 2000 than they did in 1992, while earnings for those in the lowest 10 percent increased only 5 percent during the 8-year period.

The widening disparity in earnings for all educational groups implies that earnings are determined by factors other than education. These factors include the State and city in which the job is located, how large the company is, and whether the job is in the public sector or private sector. Experience and occupation also affect earnings.

The more experience workers have, the higher their earnings usually are. Having experience plus a degree

Chart 2

Unemployment of workers aged 25 and over by highest level of educational attainment, 2000

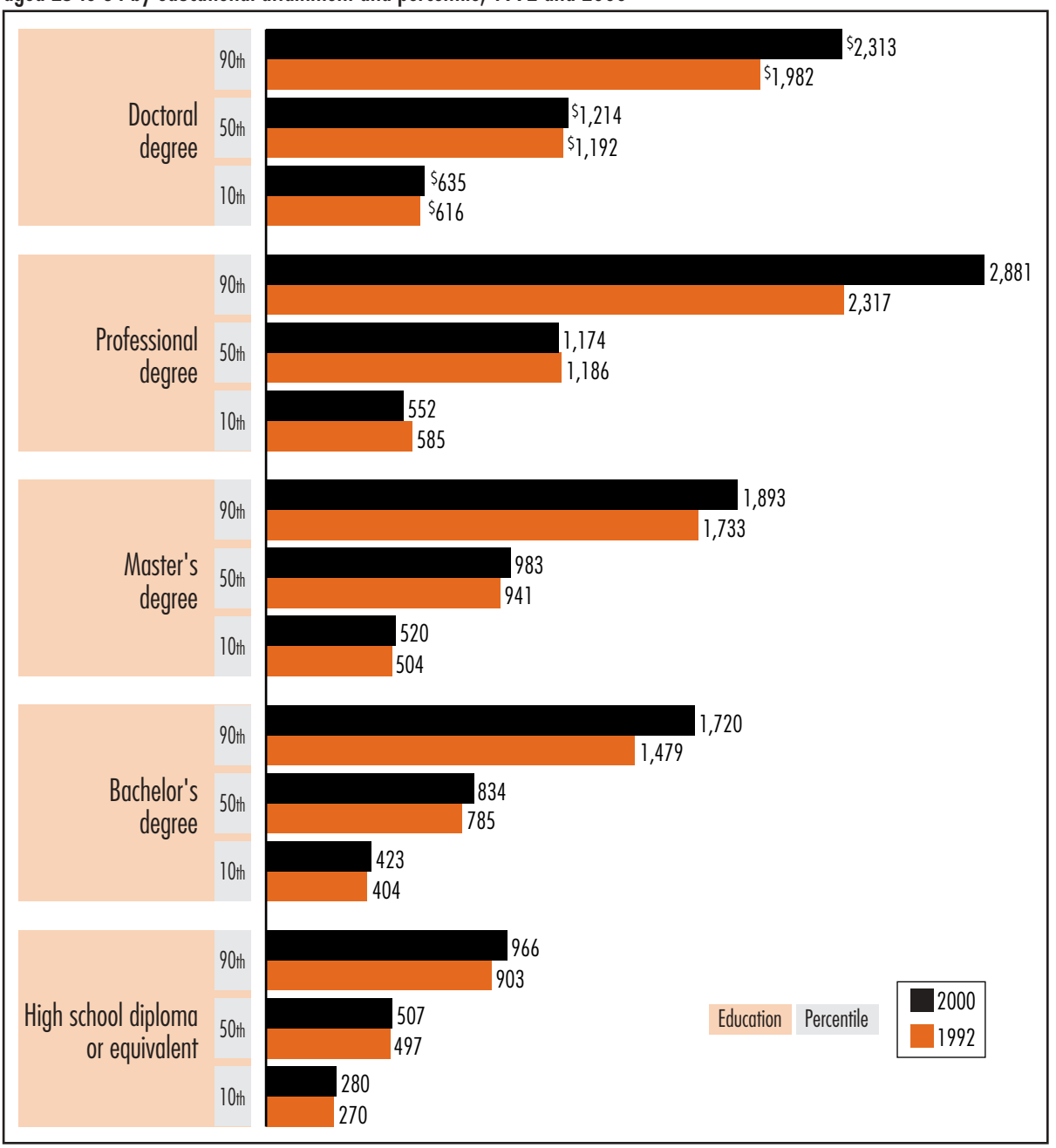


enhances a worker's ability to qualify for promotions and positions of responsibility, leading to higher salaries. And in occupations in which establishing a client base is required to earn top salaries—some sales jobs, for example—the longer a worker remains in an occupation, the more lucrative it becomes.

Experience contributes to salary variations within occupations, even those that have high salaries. Engineers' weekly earnings in 2000, for example, ranged from at least $1,782 for the top 10 percent to less than $608 for the lowest 10 percent. Chart 4 shows the wide dispersion of earnings within some other occupations in which most workers hold a college degree.

Chart 3

Real weekly earnings of full-time wage and salary workers aged 25 to 64 by educational attainment and percentile, 1992 and 2000



The level of educational attainment and field of study also affect one's earnings power. Physicians, lawyers, and top executives usually command high salaries, reflecting their extra schooling and responsibilities. And even within an occupation, earnings increase for workers who pursue additional education. For example, as table 1 shows, the median weekly earnings for administrators in education and related fields in 2000 were $764 for those with a bachelor's degree, $1,105 for those with a master's degree, and $1,250 for those with a doctoral degree.

Workers' choice of occupation affects earnings potential, too. Table 1 also shows that in 2000, weekly earnings for architects with a bachelor's degree—the highest level of education for most workers in that occupation—were $1,159, nearly 42 percent more than the $817 weekly earnings for librarians with a master's degree, who were the majority in that occupation.

Analyzing the college graduate outlook, 2000-10

As data in the previous section showed, earning a college degree is an attractive option for many people. Will this trend continue into the next decade? To explore this question, the

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Chart 4

Usual weekly earnings of full-time wage and salary workers aged 25 to 64 in selected occupations, 2000

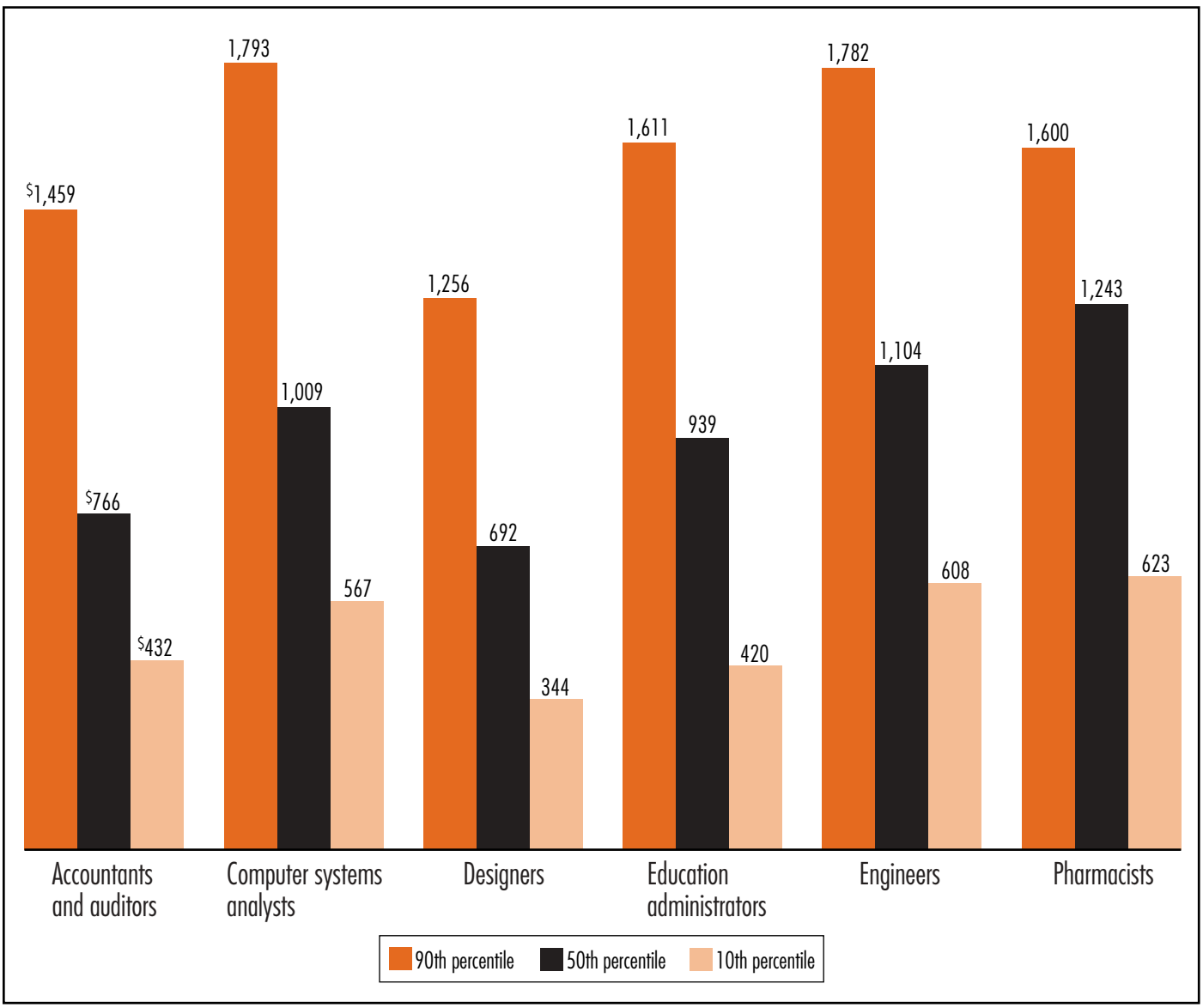

Table 1

Median weekly earnings of workers in selected occupations by highest level of educational attainment, 2000

Occupation	Highest level of educational attainment									
	High school diploma or equivalent		Bachelor's or higher degree (all levels)		Bachelor's degree		Master's degree		Professional degree or Ph.D.	
	Share of occupation (percent)	Median earnings	Share of occupation (percent)	Median earnings	Share of occupation (percent)	Median earnings	Share of occupation (percent)	Median earnings	Share of occupation (percent)	Median earnings
All occupations	**31**	**$507**	**31**	**$897**	**21**	**$834**	**7**	**$983**	**3**	**$1,197**
Accountants and auditors	7	578	72	921	57	876	14	1,118	–	–
Actors and directors	–	–	66	1,092	55	1,078	–	–	–	–
Administrators and officials, public administration	15	732	57	1,025	33	901	20	1,124	–	–
Administrators, education and related fields	8	498	77	1,042	22	764	43	1,105	11	1,250
Advertising and related sales occupations	–	–	53	970	48	990	–	–	–	–
Aerospace engineers	–	–	84	1,276	–	–	–	–	–	–
Airplane pilots and navigators	–	–	77	1,441	70	1,436	–	–	–	–
Architects	–	–	89	1,134	54	1,159	30	1,103	–	–
Assemblers	52	468	6	460	5	478	–	–	–	–
Authors	–	–	80	882	49	765	–	–	–	–
Biological and life scientists	–	–	99	869	–	–	–	–	–	–
Bookkeepers, accounting, and auditing clerks	40	477	14	562	12	551	–	–	–	–
Buyers, wholesale and retail trade, except farm products	29	505	32	934	29	943	–	–	–	–
Carpenters	49	614	5	721	4	714	–	–	–	–
Cashiers	50	303	8	384	7	372	–	–	–	–
Chemical engineers	–	–	90	1,265	–	–	–	–	–	–
Chemists, except biochemists	–	–	90	984	47	884	–	–	–	–
Civil engineers	–	–	83	1,095	55	1,019	25	1,256	–	–
Clergy	–	–	78	742	23	790	42	698	–	–
Clinical laboratory technologists and technicians	–	–	46	713	42	700	–	–	–	–
Computer programmers	10	864	63	1,039	49	1,019	12	1,087	–	–
Computer systems analysts and scientists	6	887	72	1,132	51	1,081	18	1,243	–	–
Cooks	44	327	5	396	4	386	–	–	–	–
Counselors, educational and vocational	–	–	90	827	24	725	60	842	–	–
Data processing equipment repairers	23	686	26	725	21	721	–	–	–	–
Data-entry keyers	45	475	13	514	12	510	–	–	–	–
Dentists	–	–	99	1,310	–	–	–	–	91	1,508
Designers	16	633	50	794	43	771	–	–	–	–
Economists	–	–	83	965	50	799	–	–	–	–
Editors and reporters	–	–	80	830	62	803	–	–	–	–
Electrical and electronic engineers	–	–	74	1,242	49	1,170	21	1,350	–	–
Electrical and electronic technicians	22	701	20	817	18	782	–	–	–	–
Electricians	41	714	7	976	–	–	–	–	–	–
English teachers	–	–	96	1,010	–	–	–	–	–	–
Farmers, except horticultural	47	452	18	450	14	450	–	–	–	–
Financial managers	13	611	63	1,222	45	1,125	16	1,432	–	–
General office clerks	45	459	15	585	12	552	–	–	–	–
Guards and police, except public service	43	467	14	592	12	563	–	–	–	–

Table 1 (continued)

Median weekly earnings of workers in selected occupations by highest level of educational attainment, 2000

Occupation	Highest level of educational attainment									
	High school diploma or equivalent		Bachelor's or higher degree (all levels)		Bachelor's degree		Master's degree		Professional degree or Ph.D.	
	Share of occupation (percent)	Median earnings	Share of occupation (percent)	Median earnings	Share of occupation (percent)	Median earnings	Share of occupation (percent)	Median earnings	Share of occupation (percent)	Median earnings
Industrial engineers	–	–	63	$1,070	48	$1,072			–	–
Inspectors and compliance officers, except construction	–	–	51	900	38	895	–	–	–	–
Insurance adjusters, examiners, and investigators	31	$517	30	673	26	683	–	–	–	–
Insurance sales occupations	21	537	47	891	41	889	–	–	–	–
Investigators and adjusters, except insurance	38	482	19	577	17	579	–	–	–	–
Janitors and cleaners	47	374	4	398	3	404	–	–	–	–
Lawyers	–	–	99	1,331	–	–	–	–	89	$1,356
Legal assistants	21	563	37	725	30	711	–	–	–	–
Librarians	–	–	77	750	28	575	46	$817	–	–
Management analysts	–	–	72	1,263	41	1,238	26	1,388	–	–
Managers, food serving and lodging establishments	34	540	26	800	22	799	–	–	–	–
Managers, marketing, advertising, and public relations	10	802	67	1,306	52	1,208	15	1,527	–	–
Managers, medicine and health	15	556	51	958	31	897	16	1,047	–	–
Managers, properties and real estate	28	574	35	893	28	896	–	–	–	–
Managers, service organizations n.e.c.	17	520	59	881	38	830	19	915	–	–
Mechanical engineers	–	–	74	1,193	53	1,117	19	1,452	–	–
Medical scientists	–	–	92	840	–	–	–	–	–	–
Musicians and composers	–	–	55	781	–	–	–	–	–	–
Nursing aides, orderlies, and attendants	46	342	6	386	5	393	–	–	–	–
Operations and systems researchers and analysts	–	–	58	1,010	39	984	–	–	–	–
Other financial officers	14	628	60	1,072	46	951	13	1,337	–	–
Painters, sculptors, craft artists, and artist printmakers	–	–	52	739	40	736	–	–	–	–
Personnel and labor relations managers	–	–	59	1,107	42	1,007	–	–	–	–
Personnel, training, and labor relations specialists	15	599	52	849	7	806	12	963	–	–
Pharmacists	–	–	96	1,260	63	1,270	–	–	–	–
Photographers	–	–	57	744	45	729	–	–	–	–
Physical therapists	–	–	88	942	48	936	37	964	–	–
Physicians	–	–	99	1,361	–	–	–	–	92	1,432
Police and detectives, public service	20	726	29	886	26	867	–	–	–	–
Postsecondary teachers, subject not specified	–	–	94	896	20	601	31	749	43	1,090
Psychologists	–	–	93	848	–	–	45	745	35	1,097
Public relations specialists	–	–	75	825	55	786	–	–	–	–
Purchasing agents and buyers n.e.c.	28	658	31	891	27	838	–	–	–	–
Purchasing managers	–	–	48	1,092	–	–	–	–	–	–
Real estate sales occupations	18	614	43	918	35	894	–	–	–	–
Receptionists	49	407	10	418	9	420	–	–	–	–

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following section analyzes projected job openings for college graduates between 2000 and 2010. The analysis begins with an explanation of how employment projections were created and ends with a discussion of how occupational changes affect the job outlook for college graduates.

Background

The Office of Occupational Statistics and Employment Projections of BLS develops employment projections for hundreds of detailed occupations. These projections are used in a variety of occupational studies, including these analyses of the job outlook for college graduates. The first such

Table 1 (continued)

Median weekly earnings of workers in selected occupations by highest level of educational attainment, 2000

	Highest level of educational attainment									
	High school diploma or equivalent		Bachelor's or higher degree (all levels)		Bachelor's degree		Master's degree		Professional degree or Ph.D.	
Occupation	Share of occupation (percent)	Median earnings	Share of occupation (percent)	Median earnings	Share of occupation (percent)	Median earnings	Share of occupation (percent)	Median earnings	Share of occupation (percent)	Median earnings
Registered nurses	–	–	55	$866	45	$838	8	$1,004	–	–
Religious workers n.e.c.	–	–	58	677	–	–	–	–	–	–
Sales occupations, other business services	21	$587	46	954	38	933	–	–	–	–
Sales representatives, mining, manufacturing and wholesale	21	627	45	961	40	946	5	1,247	–	–
Sales workers, motor vehicles and boats	41	726	21	730	19	759	–	–	–	–
Sales workers, other commodities	38	350	25	650	21	661	–	–	–	–
Sales workers, radio, television, hi-fi, and appliances	–	–	39	1,071	–	–	–	–	–	–
Secretaries	44	453	10	490	9	490	–	–	–	–
Securities and financial services sales occupations	–	–	71	1,146	53	1,094	14	1,395	–	–
Social workers	8	507	73	660	42	612	29	753	–	–
Speech therapists	–	–	97	818	–	–	79	806	–	–
Street and door-to-door sales workers	25	410	32	674	23	777	–	–	–	–
Supervisors, construction	44	788	12	881	10	867	–	–	–	–
Supervisors and proprietors, sales occupations	34	550	29	860	24	828	4	1,094	–	–
Supervisors, general office	29	564	25	739	20	699	–	–	–	–
Supervisors, production occupations	45	655	14	982	11	971	–	–	–	–
Teacher aides	38	323	18	387	15	381	–	–	–	–
Teachers, except postsecondary	14	572	59	799	39	744	18	895	–	–
Teachers, elementary school	–	–	93	745	54	670	37	869	–	–
Teachers, prekindergarten and kindergarten	15	289	56	701	38	625	18	823	–	–
Teachers, secondary school	–	–	95	809	47	719	45	895	–	–
Teachers, special education	–	–	93	737	42	637	50	826	–	–
Transportation ticket and reservation agents	26	511	25	521	22	576	–	–	–	–
Truckdrivers	52	592	5	691	4	688	–	–	–	–
Veterinarians	–	–	98	1,018	–	–	–	–	–	–
Waiters and waitresses	46	308	10	394	9	396	–	–	–	–

Note: The data include only full-time, year-round workers aged 24 to 65.
Source: Current Population Survey

– = Data not shown where survey respondents number fewer than 50,000
n.e.c. = not elsewhere classified

analysis was published in the *Occupational Outlook Quarterly* in 1968, and updates have appeared nearly biennially since then. Past articles projected whether there would be an imbalance between the supply of and demand for college graduates in the workforce over the projections period.

However, the method used in recent years for projecting the number of job openings for college graduates is no longer feasible. Recent changes in occupational definitions resulted in a break in historical continuity. The latest employment projections, which cover the 2000-10 decade, were developed using the Federal Government's 2000 Standard Occupational Classification System. The 1990 census-based Current Population Survey, the source of data on educational attainment, has not yet converted to this new occupational classification system. Thus, comparable data on the proportions of occupations usually filled by college graduates—the basis for analyzing the demand for college graduates—no longer exist for all occupations. (See box at right.)

Another factor complicating the analysis of the college-graduate outlook is the ever-changing notion of which jobs require a college degree. Many occupations previously considered to require that all workers have a college degree included significant proportions of workers whose highest levels of educational attainment are an associate degree or, in some cases, a high school diploma. Few occupations actually require that all workers have a college degree to perform their duties. Instead, many occupations now are categorized as college preferred.

BLS will continue to reevaluate its method of assessing the outlook for college graduates in the future.

Projected job openings for college graduates

Over the next decade, the availability of jobs for college graduates will depend both on employment growth in occupations that usually are filled by college graduates and on the need to replace college graduates who permanently leave an occupation.

Job growth. BLS projects that overall employment will grow 15 percent between 2000 and 2010, resulting in 22 million new jobs. Much of this growth is projected to be in occupations in which large numbers of college graduates are employed. Among major occupational groups, the professional and related occupations group is projected to increase its relative share of employment by 2010. This group is projected to grow faster (26 percent) and add more workers (7 million) than any other group. About 80 percent of its workers aged 25 to 34 are college graduates, and nearly half

Comparison of occupational classification systems

The following box compares the major occupational groups that compose two occupational classification systems—the Current Population Survey (CPS) and the Standard Occupational Classification System (SOC). In this article, data on educational attainment are based on the CPS, and data on employment and job openings are based on the SOC.

Current Population Survey (CPS)	Standard Occupational Classification (SOC)
Executive, administrative, and managerial occupations	Management, business, and financial occupations (includes farm manager, which CPS classifies under farming, forestry, and fishing occupations)
Professional specialty occupations	Professional and related occupations (includes technicians)
Technicians and related support occupations	
Sales occupations	Sales and related occupations
Service occupations	Service occupations
Administrative support occupations, including clerical	Office and administrative support occupations
Farming, forestry, and fishing occupations	Farming, fishing, and forestry occupations
	Construction and extraction occupations (CPS classifies this group under precision production, craft, and repair occupations)
Precision production, craft, and repair occupations	Installation, maintenance, and repair occupations (CPS classifies this group under precision production, craft, and repair occupations)
Operators, fabricators, and laborers	Production occupations (CPS classifies this group under precision production, craft, and repair occupations and operators, fabricators, and laborers)
	Transportation and material moving occupations (CPS classifies this group under operators, fabricators, and laborers)

of all graduates are employed in this group.

Occupations employing primarily college graduates are projected to be among the fastest growing in the Nation. Table 2 shows projected job growth in occupations in which college graduates make up at least 50 percent of the workforce. These occupations employ at least 50,000 workers and are reasonably comparable between the two occupational classification systems—the Standard Occupational Classification System and the Current Population Survey—permitting an occupation's growth rate to be associated with its workers' educational attainment. Of the 43 occupations in the table, 33—77 percent—are projected to grow faster than the 15-percent increase projected for all occupations through 2010.

Replacement needs. The most significant source of demand for all workers, including college graduates, over the next decade will come not from job growth but from net replacement needs: the need to replace workers who permanently leave their occupations. For all education levels, job openings from replacement needs are projected to total 35 million between 2000 and 2010—48 percent more than the job openings resulting from employment growth. About 6 million

Table 2

Employment growth in occupations in which at least 50 percent of workers have a bachelor's or higher degree, 2000 and projected 2000-10

(Numbers in thousands)

Occupation*	Employment, 2000	2010, projected	Percent change, projected
Total, all occupations	**145,594**	**167,754**	**15**
Computer systems analyst and scientist	459	729	59
Physician assistant	58	89	54
Public relations specialist	137	186	36
Therapist	439	584	33
Manager, marketing, advertising, and public relations	707	936	32
Medical and health services manager	250	330	32
Veterinarian	59	77	32
Social worker	468	609	30
Technical writer	57	74	30
Management analyst	501	646	29
Author	126	162	28
Actor, producer, and director	158	200	27
Advertising sales agent	155	196	26
Registered nurse	2,194	2,755	26
Counselor, educational and vocational	205	257	25
Pharmacist	217	270	24
Teacher, college and university	1,344	1,659	23
Securities and financial services sales occupations	367	449	22
Architect	124	150	21
Biological and life scientist	184	218	21
Accountant and auditor	976	1,157	19
Dietitian and nutritionist	49	56	19
Financial manager	658	780	19
Teacher, special education	453	592	19
Lawyer	681	803	18
Personnel, training, and labor relations specialist	490	578	18
Physical scientist	423	501	18
Physician	598	705	18
Social scientist and related occupations	410	492	18
Teacher, prekindergarten and kindergarten	597	707	18
Teacher, secondary school	1,113	1,314	18
Photographer	131	153	17
Computer programmer	585	680	16
Clergy	171	197	15
Education administrator	453	513	13
Human resources manager	219	246	13
Librarian	149	160	12
Teacher, elementary school	2,122	2,381	12
Airplane pilot and navigator	117	129	10
Engineer	1,465	1,603	9
Operations research analyst	47	51	8
Dentist	152	161	6
Editor and reporter	78	80	3

*For these occupations, the definitions are generally comparable between the Current Population Survey and Standard Occupational Classification Manual (SOC). The occupational titles and growth rates are based on the SOC.

openings from replacement needs are projected to be in occupations in which a significant proportion of workers has a college degree.

Millions of older workers, including a high proportion of baby boomers with college degrees, are expected to retire by 2010, leaving a large number of job vacancies to be filled by college graduates. For example, educators were hired in large numbers in the 1960s and 1970s to teach the baby boomers, and many of these educators will be eligible to retire over the 2000-10 decade. (For an article about baby-boom retirements and job openings based on the previous set of employment projections, 1998 to 2008, see "Gauging the labor force effects of retiring baby boomers," in the July 2000 *Monthly Labor Review*, also available online at **www.bls.gov/opub/mlr/2000/07/art2full.pdf**.)

Growth and replacement: A summary. Projected job openings for college graduates may be summarized by examining the two major occupational groups that employ the most college graduates—management, business, and financial occupations and professional and related occupations. In 2000, 72 percent of all college graduates were employed in these two groups, making the employment projections for these groups critical to the overall job outlook for college graduates.

To determine the potential number of job openings for college graduates in each of these two occupational groups, BLS analysts multiplied the proportion of the group's 25- to 34-year-old workers with a degree in 2000—those most recently hired—by the total number of openings expected from growth and net replacement needs in the group between 2000 and 2010. The following tabulation shows the results of these calculations in managerial and professional occupations:

Occupational group	*Total job openings due to growth and net replacements, projected 2000-10*	*Proportion of 25- to 34-year-olds with college degree in occupational group*	*Potential job openings for college graduates*
Management, business, and financial occupations	5,109,000	56.5	2,886,600
Professional and related occupations	12,160,000	81.5	9,910,400

The potential number of job openings for college graduates in these two groups is nearly 13 million, which represents 22 percent of the 58 million job openings stemming from employment growth and net replacement needs projected for the entire economy over the 2000-10 decade. This number may well be an underestimate because the calculation assumes that the proportion of college graduates in each occupational group remains constant—and it is reasonable to expect that, given the increase in educational attainment in recent years, the proportion of graduates will rise in each of these groups.

These 13 million potential job openings exclude college graduates in some increasingly college-preferred occupations, particularly sales. With about 37 percent of 25- to 34-year-old college graduates holding jobs in this category, sales is becoming a career choice for many college graduates, especially in the business and financial, advertising, and technology fields. However, most sales workers are employed in retail and services—jobs that are filled by relatively few college graduates.

College in the workforce: Educational upgrading

Between 1992 and 2000, the number of full-time wage and salary workers with a college degree increased 33 percent. In response to this growing availability of college graduates, their proportions in many occupations are growing. But some occupations have experienced greater than average increases in college graduates, signifying either employer preferences or changes in those occupations. This increasing level of educational attainment in specific occupations is called educational upgrading.

Educational upgrading has been particularly noticeable in the health and protective service occupations and in occupations that usually are considered desirable and well paid, such as airline pilot and flight attendant. Flight attendant, for example, is an occupation that offers relatively high salaries and popular benefits, such as travel and the opportunity to experience other cultures. College graduates, especially younger ones, are attracted to the occupation: in 2000, 44 percent of flight attendants aged 25 to 34 held a bachelor's degree. This compares with 28 percent of all flight attendants with a college degree.

There are many reasons for educational upgrading, including the need for more highly skilled workers to compete in an increasingly complex global economy. Growing competition has forced companies to emphasize sales and customer service and, thus, to seek employees with strong communication skills. Employers often feel that, compared to non-college-educated workers, college graduates are more motivated, learn tasks more quickly, are better able to meet deadlines, and have better problemsolving and

Table 3

Changes in educational attainment, 1992-2000

(percent)

Occupation	Share of employment in occupational group[1]		Workers aged 25 to 34 with bachelor's or higher degree		Workers aged 25 to 34 with advanced degree	
	1992	2000	1992	2000	1992	2000
Total, all workers	**100**	**100**	**26**	**33**	**6**	**8**
Executive, administrative, and managerial occupations	13	15	49	57	9	12
Professional specialty occupations	14	16	76	82	29	30
Engineer, architect, and surveyor			83	84	23	23
Mathematical and computer scientist			74	76	20	18
Natural scientist			90	94	45	44
Health diagnosing occupations			97	99	95	97
Health assessment and treating occupations			62	71	14	20
Registered nurse			55	63	8	7
Therapist			73	82	28	48
Teacher, college and university			94	98	66	72
Teacher, except college and university			82	87	22	27
Social scientist and urban planner			81	91	42	46
Writer, artist, entertainer, and athlete			56	69	10	9
Technicians and related support occupations	4	3	32	36	6	5
Sales occupations	12	12	31	37	3	4
Sales representative, finance and business services			54	60	7	6
Sales representative, mining, manufacturing, and wholesale			48	54	4	5
Sales worker, retail and personal services			17	20	2	3
Administrative support occupations, including clerical	16	14	16	17	–	–
Private household occupations	1	1	9	7	2	2
Service workers, except private household	13	13	9	11	–	–
Protective service occupations			14	21	–	–
Firefighting and fire prevention occupations			13	23	1	2
Police and detective			15	24	–	–
Farming, forestry, and fishing occupations	3	3	7	9	–	–
Farm operator and manager			13	21	–	–
Precision production, craft, and repair occupations	11	11	6	7	–	–
Mechanic and repairer			5	8	–	–
Construction trades			5	5	–	–
Machine operators, assemblers, and inspectors	6	5	4	4	–	–
Transportation and material moving occupations	4	4	4	5	–	–
Handlers, equipment cleaners, helpers, and laborers	4	4	3	5	–	–

[1] Includes workers of all ages and all levels of educational attainment. Data are provided only for major occupational groups (in bold).

– = less than 2 percent of workers have a degree

communication skills. And because many cost-conscious employers have limited the amount of training they offer, they prefer to hire more-educated workers who can assume greater responsibility sooner. As a result, college graduates are increasingly employers' first choice.

Table 3 shows the change in the proportion of 25- to 34-year-old college graduates within major occupational groups and selected detailed occupations that either experienced significant educational upgrading between 1992 and 2000 or are key occupations in the group. Percentages may be slightly underestimated, particularly with respect to the proportion of workers with an advanced degree, because although only 11 percent of undergraduates are over 35 years old, 33 percent of people attending graduate school are over age 35. Data do not indicate whether students are seeking a degree or are taking courses but are not in a degree program.

The proportion of 25- to 34-year-old workers with a college degree increased for all major occupational groups except private household workers. In addition, the three major occupational groups with the largest proportions of young college graduates—executive, administrative, and managerial; professional specialty; and sales—also had the greatest proportional growth in employment between 1992 and 2000. The sharpest increases in educational upgrading, however, were in other categories, such as farm operators and managers and protective service occupations.

As Table 3 also shows, the proportion of 25- to 34-year-olds with an advanced degree also increased from 1992 to 2000, particularly among health assessment and treating occupations—in fact, the 20 percentage-point increase in advanced-degree attainment for therapists is the largest of all the occupations in the table.

Conclusions and further study

As this article has discussed, college graduates' rising wages and growing numbers of available jobs are evidence of their demand in the workforce. How might labor markets react to this increasing demand? One possibility is that real wages for college graduates may continue to increase over the next decade. As compensation for those with a college degree continues to rise, more high school students might choose to go to college, and college graduates might select careers in which wages are increasing the fastest.

Also, depending on earnings in other occupations, college graduates working in jobs that generally are not filled by college graduates might transfer into higher paying occupations that are college preferred. Employers might also adjust their hiring strategies, with some deciding to hire—and provide training to—workers whose highest level of educational attainment is less than a bachelor's degree.

It is important to remember that individual job prospects depend on openings in a specific occupation—not on the overall number of jobs available to all college graduates. Projections vary by occupation, and this article presents information about job openings and earnings for a number of specific occupations employing significant numbers of college graduates.

To learn more about occupations that are college preferred or that require a college degree, visit your local library or career counselor's office. Among the references to look for is the *Occupational Outlook Handbook, 2002-03 Edition* (BLS Bulletin 2540), which includes training requirements as part of the description for hundreds of occupations. The *Handbook* is also available online at **www.bls.gov/oco/home.htm**.

Another way to learn about occupations is to attend job fairs and arrange informational interviews. Job fairs showcase employers seeking qualified job candidates, often those who have a college degree; informational interviews allow jobseekers to learn about specific occupations by interviewing workers in those occupations. Both subjects are explored in recent *Occupational Outlook Quarterly* articles: job fairs as part of "Employment interviewing: Seizing the opportunity and the job" (Summer 2000) and informational interviews in "Informational interviewing: Get the inside scoop on careers" (Spring 2002). Other *Quarterly* articles of interest to college students and graduates range from résumés and cover letters (Summer 1999) to distance learning (Summer 2001). Many of these articles are available as reprints or online at **www.bls.gov/opub/ooq/ooqhome.htm**.

In addition to the *Handbook* and the *Quarterly*, BLS has other career-related resources. For career information from an industry perspective, see the *Career Guide to Industries, 2002-03 Edition* (BLS Bulletin 2541), also available online at **www.bls.gov/oco/cg/home.htm**. The November 2001 issue of the *Monthly Labor Review* is devoted to the Bureau's 2000-10 projections of the U.S. economy, labor force, industry employment, and occupational employment. The *Review* is accessible online at **www.bls.gov/opub/mlr/mlrhome.htm**.

Finally, to explore employment, earnings, and other BLS data, visit its Web site at **www.bls.gov**.