DOCUMENT RESUME

ED 202 433 HE 013 956

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TITLE Supply and Demand for Persons with Postsecondary Education.
INSTITUTION Educational Policy Research Center for Higher Education and Society, Washington, D.C.; Froomkin (Joseph) Inc., Washington, D.C.
SPONS AGENCY Department of Health, Education, and Welfare, Washington, D.C.
PUB DATE Oct 76
CONTRACT 300-76-0026
NOTE 67p.

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Academic Achievement; *College Graduates; *Education Work Relationship; *Employment Patterns; Futures (of Society); *Labor Force; *Labor Market; *Postsecondary Education; Productivity; Promotion (Occupational); Relevance (Education)

ABSTRACT

Analysis of recent developments in the supply of college graduates, non-completers in postsecondary education, demographic and educational developments in the 1960's, and projections for employment in 1985 suggest that an increasing proportion of younger, well-educated workers will be filling jobs where their postsecondary education will be of limited relevance. Many of these jobs will be in industry and in profit-oriented services. It is argued that the recent emphasis on training students for openings in the public sector no longer needs support. An important consequence seen in the presence of a large number of underused educated workers is that they will block merit promotion routes for persons with less impressive educational credentials, or that entry-level jobs for the better-educated will deteriorate. An examination of earning trends is suggested to determine whether additional education is contributing to productivity or just being used as a screening device. It is concluded that by 1985 roughly a third of college graduates will be in positions previously held by persons with less education, and two-thirds of persons with some postsecondary education will hold jobs previously filled by persons with only a high school degree. Appended are extensive tables and summaries of estimates of demand and supply for labor by level of education (population of working age, labor force participation rates) and of the demand for educated manpower (the Gross National Product and industry employment, labor force projections by occupation, and employment by educational level). (MSE)

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SUPPLY AND DEMAND FOR PERSONS WITH POSTSECONDARY EDUCATION

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EPRC for Higher Education and Society

Contract No. 300760026

October 1976

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Since the end of World War II, a few pessimists have worried about the ability of the U.S. economy to provide good jobs for an increasingly well-educated labor force. Events proved them wrong for two and a half decades. In the early 1970's, the prognosis of the pessimists finally proved to be true, as college graduates began to experience increasing difficulty in finding high-paying and high-status jobs.

The study which follows identifies the changing conditions in the labor market which make for this turn-around in employment patterns. It (1) examines recent developments in the employment of college graduates and persons with some postsecondary training, (2) contrasts these recent trends with developments in the 1960's, and (3) draws tentative conclusions about jobs likely to be filled by persons with some college or a full college education between now and 1985. It then highlights the dependence of new job openings upon relative growth of the private and public sectors, and concludes with a pessimistic prognosis of the chances of persons with college education obtaining the kind of jobs they filled in the 1960's.

RECENT DEVELOPMENTS

College graduates. Despite numerous projections of the increasing numbers of college graduates likely to enter the labor market in the 1970's and the 1980's, the recent difficulties of college graduates in finding suitable jobs have come as un unpleasant surprise. This turning point was not anticipated by the general run of labor force analysts, coming as it did after decades when persons with a college education were

absorbed painlessly by the labor market.

The proportion of persons with at least four years of post-secondary education made up 10 per cent of all employed persons in 1960, and reached 13 per cent in 1970.[1] But there was no evidence of a surplus. Without any objective evidence to indicate a turning point, most economists remained optimistic up to the early 1970's. Then, between 1970 and 1975, the imbalance between college graduates and suitable jobs started to become apparent. The employment of these highly educated workers grew 2.5 times as fast as the total number of employed workers during the 1960's, and 5.2 times as fast in the five years 1970-75. By 1975, nearly 17 per cent of all employed persons were college graduates.[2] Some misgivings about finding jobs for 3.7 million college graduates between 1970 and 1975 (a number almost equal to the total increase in the employment of persons with this level of education in the past ten years) might have been expected.[3]

A detailed examination of the industries in which college-educated workers found jobs could have alerted observers to the current crisis. Between 1950 and 1960, and 1960 and 1970, between 46 and 58 per cent of new jobs usually filled by college graduates (professional or managerial) were created either in government, education, or in other services which are usually non-profit (such as hospitals, welfare organizations, etc.).[4] Despite the rapid growth of these industries during the period 1970 to 1975, when their employment grew 5.9 per cent a year, as contrasted

to 5.1 per cent during the 1960's, an insufficient number of professional and managerial jobs was created to absorb the growing number of college graduates seeking work.[5]

In the 1970 to 1975 period, as employment levels of the profit-oriented sector of the economy scarcely changed, an even higher proportion of new jobs for college graduates was provided by the non-profit sector. During this time, some 71 per cent of additional positions filled by college graduates came from this sector of the economy, 13 per cent more than in the previous decade. The proportion of college graduates employed by this group of activities increased from 33 to 36 per cent, nowhere more dramatically than in the federal government, where 28 per cent of the persons employed in 1975 had completed four years of education beyond high school, as contrasted to 20 per cent in 1970.[6] In the rest of the economy, college graduates took managerial and professional jobs away from persons with less education. Their share in total employment increased by roughly two per cent, until one out of ten persons who were employed in agriculture, construction, mining, manufacturing and for-profit service sectors possessed a college degree.

The prospects for the next 10 years are certainly not encouraging: another 6.5 million college graduates will be added to the labor force, and the proportion of persons with this level of education will increase from the current level of 16.7 per cent to some 20 to 21 per cent in 1985. It is probable that the growth of employment in the not-for-profit sector

will moderate, both because of the current disenchantment with big government and because enrollments in schools and colleges will either remain stable or decline.[7] Hence, even though the rate of increase in the proportion of college-educated persons in the labor force will decline, the problems faced by persons with this level of education are likely to remain.

Unless employment patterns change drastically, college-trained persons, in order to find work at all, will have to accept jobs in other than professional or administrative fields. This trend has already started manifesting itself. For instance, in both 1960 and 1970, some 84 per cent of all college graduates reported working as either professionals or managerial and administrative employees. By 1975, this proportion had declined to 78 per cent, mostly due to the lower proportion of college-educated persons able to find jobs in the professions.[8]

There is also some evidence that the quality of jobs filled by younger college graduates is deteriorating, as their earnings have been growing more slowly than those of persons with a high school education. Between 1969 and 1974, the mean earnings of male college graduates aged 25 to 34 increased by 19 per cent, while those of high school graduates increased by 32 per cent.[9] In real terms, the earnings of college graduages, after deflation by the CPI, were reduced by some 13 per cent during the five-year period, in contrast to those of high school graduates which declined by less than two per cent.

The difficulties which college graduates have experienced in

landing jobs are also reflected in their higher unemployment rate. College graduates under age 25 had a 6.4 per cent unemployment rate in 1975, as contrasted to 2.4 per cent in 1970. While total unemployment rate less than doubled between these two years, that of young college graduates nearly trebled.[10]

Non-completers. College graduates are taking away jobs in the professions from persons who have not completed college. Despite the fact that a lower proportion of all college graduates are in professional jobs, the proportion of college graduates to total professional employment has increased, and the proportion of persons with less than four years of college in this type of employment declined. More importantly, the chances of landing a professional job, even a low-level one, appears to have dropped significantly for persons with some college education between 1970 and 1975. Roughly one out of five persons with some college education reported himself as employed in a professional job in both 1960 and 1970. By 1975, however, only one out of six workers with this level of education was in that category.[11]

The collars of those who do not complete college are increasingly likely to be blue, especially among men. Nearly half of the employed male workers with less than four years of postsecondary education now find work in blue-collar jobs. Women, by contrast, are most likely to be employed in white-collar occupations, thus suffering increasing competition from the college-educated females who are forced to seek less desirable

jobs.

The next section will document that the job prospects of persons with less than four years of college education were less favorable during the 1960's than those of persons with college degrees. Yet in the period 1970 to 1975, their earnings held up better than those of college graduates. One can thus conclude that the professional jobs they were filling were paying not much better than the blue-collar jobs they are filling now.

It is worth noting that the unemployment rates of persons with some college education stand mid-way between those of persons with a high school education and those of college graduates. In 1970, they were 3.9 per cent, and in 1975 6.9 per cent.[12]

Another significant recent development is the increased dependence of persons with some college upon jobs in the non-profit sector. In 1970, the proportion of persons with some college in this sector was roughly proportional to their share in total employment, i.e., 17 per cent. Between 1970 and 1975, roughly half of all the new jobs filled by persons with some college were outside of the profit sector.

Some tentative conclusions. The more detailed analysis of the employment patterns of college graduates and persons with some post-secondary education fills one with pessimism about their job prospects. This pessimism would be warranted even if the economy were operating at close to full employment in 1975. With the most optimistic assumptions

about employment developments, namely (1) that employment in the profit sector will increase by some 7 per cent, reducing the overall unemployment rate from the nine per cent experienced in 1975 to four per cent, and (2) that jobs in the professions and management will increase in proportion to this employment, it is still clear that not enough suitable jobs will be created to restore the employment patterns to the 1970 parities. Vastly increased expenditures on health, education and government services would be necessary to create a sufficient number of suitable jobs for persons with more than a high school education.

SOME REASONS FOR NOT ANTICIPATING THE PROBLEM-- THE DEVELOPMENTS IN THE 1960'S

As early as 1964, an article documented the unnecessarily high educational attainment of skilled and semi-skilled workers, as a growing number of jobs formerly held by high-school dropouts were filled by high school graduates.[13] This finding was not taken seriously, however, because as long as workers with a high school education earned more than high school dropouts, it was rationalized that their increased education endowed them with qualities that were prized in the labor market. If more education and higher earnings went hand-in-hand, there was little reason to worry about surpluses of educated persons.

Lately, it has been argued that the more desirable jobs were reserved for persons with more education, who skimmed higher-paying enings, leaving the lower-paying positions to those with less education.

Like most theories, the proposition that educated workers go to the head of the employment queue has not been conclusively proven or disproven. If it is proved true, it is possible that the increase in persons with high levels of educational attainment will not result in relative declines in earnings, and that disincentives to continue one's education will not manifest themselves. The recent declines in the relative wages of younger college graduates neither proves nor disproves this theory. Relative wages may have dropped temporarily only because of the temporary imbalance between the supply of educated workers and new job openings. Persons with more education may still be paid more than they are worth.[14]

An analysis of developments from 1959 to 1969 along conventional labor market analysis lines which follows illustrates convincingly the difficulty of testing such a theory. This analysis examines (1) distribution of persons with different levels of education within various occupations, (2) distribution of persons among occupations, (3) wages of persons with varying levels of education, and (4) relative wages of men and women.

The analysis was designed to identify surpluses and shortages of persons who had continued their education beyond high school. The following four criteria were chosen:

(1) In high-status occupations, if the proportion of persons with more education is increasing, a surplus can be surmised to exist. If, by contrast, more persons with lower levels of education fill high-status jobs, it can be presumed that an insufficient number of persons was available to fill these positions, and a shortage exists.

(2) For a given level of education, if an increasing proportion of persons with that level of education are found in lower status professions, a surplus can be inferred. By contrast, if persons with a given level of education are increasingly concentrated in high status occupations, shortages were the order of the day.

(3) If the wages of persons with a higher level of education grow more rapidly than those of persons with less education, a shortage of educated persons is observed; if they grow more slowly, there is a surplus.

(4) If male and female wages for persons in the same occupation (and age) converge, it is likely that a shortage exists. As long as male and female workers are not perfect substitutes for each other, the willingness of employers to bid up the wage of the imperfect substitute is an indication of shortages.

College graduates. An analysis of developments in the 1960's based on the 1960 and 1970 Census cannot give an inkling of the turnaround in the labor market which occurred in the 1970's:[15]

(1) The proportion of college graduates in professional occupations did not change between 1959 and 1969. Within those occupations which are reported as professional, college graduates increased their penetration of the higher-status occupations, and proportionately fewer college graduates were in low-status technical jobs. Some increase in the proportion of college graduates in managerial and administrative occupations was registered, giving grounds for some cautious interpretations, but indications of surpluses were not confirmed by the wage developments discussed in (3) below.

(2) A higher proportion of college graduates was found in

high-status occupations in 1969 than in 1959. There were indications of shortages rather than surpluses.

(3) The wage rates of college graduates increased more rapidly than those of persons with less than four years of college. Again, shortages could be surmised.

(4) The relative wages of female college graduates improved somewhat in relation to the wages of male college graduates. Again, there was no evidence of surpluses.

Similar evidence was adduced from the experience of younger college graduates, those under age 30, all of whom entered the labor market during the 1960's. They did as well as their older peers in obtaining high-status jobs. Their relative earnings increased more than those of persons with less education, and the wage disparity between men and women narrowed even more than for older workers.

Persons with less than four years of education. Evidence of shortages of persons who did not complete college is less easy to find in the 1960 and 1970 Census data:[16]

(1) Their penetration of high-status occupations, such as professionals and managers and administrators, did increase somewhat, but in the case of professionals the significant part of the increase was accounted for by employment in lower-status technical occupations.

(2) The proportion of persons with a partial college education decreased in high-status professions; significantly more men filled blue-

collar jobs, and significantly more women were employed as white-collar workers.

(3) The wages of men with some college education increased more slowly than those of workers with four years of college or those who merely graduated from high school, but women with some college education did somewhat better than high school graduates.

(4) There was little evidence of convergence between the wages of men and women.

The trends observed among all workers with a partial college education were particularly apparent among those under age 30. The shift to blue-collar occupations for males, and to white-collar occupations for females, was somewhat more pronounced than for all workers. The wages of female workers, occupation by occupation, did converge somewhat with those of males.

In summary, the labor market experience of persons who did not complete four years of college gives a somewhat mixed picture. It was not clear to what extent the down-shift to lower-status occupations was due to demand factors, and to what extent it was caused by the increased offering of blue-collar programs by junior colleges.

Benefits of hindsight. It is only with the benefit of hindsight that it is possible to draw some tentative guidelines about the kind of danger signs which presage future surpluses or shortages. During the 1960-70 period, a fortuitous set of circumstances resulted in an equilibrium

or slight shortage of persons with college degrees. This equilibrium or shortage was brought about as a result of important shifts in employment in the economy. The sectors which employed a high proportion of professional and managerial workers grew considerably faster than the others, and large numbers of college graduates found jobs in education, the health industry, other social services and government. During the same decade, the wages of college graduates employed in the non-profit sector increased more rapidly than those of college graduates in the profit sector. By 1969, the year for which earnings are reported in the 1970 Census, average rates of pay in both sectors were equal. Thus political developments which allowed the non-profit sector to grow, and administrative and political decisions which affected rates of pay, both favored college graduates.

It appears that little can be learned about the rate of substitution of non-college for college-educated manpower, and vice-versa, from an examination of the differences in their remuneration, either by occupation or for all occupations industry by industry. The market for college manpower was very competitive, and differences in the wages of college-educated personnel in different occupations narrowed substantially between 1959 and 1969.

By contrast, the experience of persons with a partial college education could provide some estimates of what happens when groups with more education substitute for those with a lower educational attainment. This substitution has occurred in a number of white-collar as well as blue-

collar occupations. In technical occupations, persons with some post-secondary training were substituted for both college graduates and persons with no postsecondary training. Unfortunately, comparisons for the total U.S. do not divulge any clear-cut trend, and more detailed econometric examination industry by industry is indicated.

The conclusion to be drawn from this survey of past trends is not comforting: The rapid growth of labor force with a given level of education is not necessarily a pre-condition for surpluses; the demand for persons with a given level of education probably plays a more important role.

The United States probably has the most elaborate system for projecting the supply of labor by level of education of any country in the Western world. Two units of the government, the U.S. Bureau of the Census and the U.S. Department of Labor, Bureau of Labor Statistics, prepare projections. The process consists of many steps, and is described in Appendix A.

JOBS IN 1985

It is difficult to visualize the kinds of jobs which are likely to be filled by persons with either some college or a full college education in 1985. Compared to 1970, when roughly one in four workers had benefited from some postsecondary education, more than four workers in ten in 1985 will have attended college one or more years.

The perception of a suitable job for persons with some college

or a full college degree will depend not only upon the overall level of employment that year, but also on the employment opportunities industry by industry. Most importantly, the equilibrium, or lack of one, between persons with a given level of education and suitable jobs will depend upon what society, and workers, believe are just deserts for education beyond high school. This subjective judgement is likely to play a more important part in determining the suitability of jobs for those with less than a full college education, compared to college graduates. Depending upon the orientation of these students, many of whom may opt for vocational or technical training, the blueing of the collar of men and the employment of women in clerical jobs may be increasingly accepted as the right mix for persons with this level of education.

The effect of the increased educational attainment of workers on their productivity, on the wages they receive, and on their level of satisfaction are three separate issues, which must be quantified if the effect of higher educational attainment on workers' attitude is to be forecast realistically.

Some preliminary judgements on these issues can be made based on trends of the past five years. To this end, this section presents estimates of the number of jobs in 1985 using both 1970 and 1975 employment standards, and contrasts these estimates with the most likely distribution of jobs by industry group for persons with some college as well as persons with college degrees.

Employment by industry group in 1985. Because the share of jobs held by college graduates and other persons with postsecondary education varies considerably industry by industry, it is extremely important to estimate the distribution of jobs by broad industrial sector in 1985.

College graduates present a particularly varied picture. In 1970, for instance, taking the economy as a whole, two out of 15 workers were college graduates; however, in the agriculture, construction and mining industries, only one out of 20 workers was a college graduate, and in manufacturing, only one in twelve workers had a college degree. The proportion of college graduates in the profit-oriented sector as a whole was one in twelve, below the average for the economy. The higher-than-average employment share of college graduates was concentrated in that part of the economy not usually operated for profit, and its level, one out of three persons employed, depended on the high proportion of workers with college degrees in education.[17]

Persons with some but less than four years of postsecondary education were much more evenly divided among industry groups. In the economy as a whole, roughly one in 15 workers reported this level of educational attainment. In agriculture, construction and mining, one in 12 workers had some college but less than a college degree, in manufacturing it was one in ten, in profit-oriented industries one in seven, and in the non-profit service sector of the economy it was one in six.

With this disparity of penetration, industry by industry,

projections of the employment shares of various sectors are crucial. For the purpose of this study, we have slightly modified the BLS employment projections for 1985. We believe that these projections are reasonable, with the exception of the estimates for the education sector. In our opinion, roughly the same number of persons will be employed in education in 1985 as were employed in 1975. In 1985, elementary and primary employments will be below the 1975 levels, and postsecondary enrollments will probably be slightly below the highs reached in 1975. Thus, our decision to keep employment constant assumes that (1) pupil/teacher ratios in elementary and secondary schools will continue to improve, and (2) that the pupil/teacher ratios in postsecondary institutions will stop deteriorating. In the light of the financial prospects of both these sectors, these assumptions are optimistic. The 1.8 million employment increase which BLS estimated was likely to occur in education was redistributed to manufacturing and profit-oriented services in proportion to previously projected employment.[18]

If the ratio of college graduates in each industry remains at the 1970 level, the year we believe a good balance was struck between college graduates and jobs, some 14.2 million jobs will be available in 1985 for some 23.0 million persons with college degrees. If the 1975 relationships and projected employment are used to calculate the number of suitable jobs, the number increases by 2 million.

In the case of persons with some college, the application of 1970 and 1975 proportions of employment produce very similar numbers

of suitable jobs, 14.1 million with the 1970 standard, and 16.5 million with the 1975 standard. The number of job-seekers with this level of education is likely to be 22-23 million.

Obviously, the proportion of persons with some college education or college degrees must increase in most industry groups. The only exception to this rule is education, where 70 per cent of all those employed already have achieved some credit beyond high school. In that industry, there has been slight tendency for college graduates to displace persons with partial college, with the share of employment of all persons beyond high school remaining virtually constant.

A distribution of the likely employment of college graduates by industry group projects the employment of college graduates will increase from 10 to 15 per cent of total employment in the profit sector, and from 36 to 42 per cent of total employment in the non-profit sector. The proportion of persons with partial college will increase more moderately, from 15 to 20 per cent in the profit sector, and from 18 to 22 per cent in the non-profit sector during the decade following 1975.

Because of the slower-than-hitherto-projected growth of the non-profit and government sectors, it is estimated that roughly 60 per cent of the new jobs filled by college graduates will be in the profit sector, as contrasted to 30 per cent in the past five years. For persons with less than a college degree, roughly four-fifths of the jobs are projected to materialize in the profit sector, as contrasted to less than half of the

total in the past five years.

Seriousness of the adjustment. It is difficult to make a prognosis about the difficulties that will be encountered in adjusting to the important shifts now taking place in the composition of the labor force by level of education. Past history is little help, since the surplus of educated persons became acute only in the past five years, a time when unemployment was exceptionally high, and employment increased very slowly.

Deterioration in both the caliber of jobs and the rate of pay of college graduates were recorded in the period 1970 to 1975, as their share of employment in the profit sector increased from eight to ten per cent, and grew in the non-profit sector from 33 to 36 per cent. In the next ten years, a period of no-growth for the education industry, the proportion of college graduates in the non-profit sector is not likely to increase, and the proportion in the profit sector may have to grow to some 15 per cent.[19]

Persons with less than four years of college employed in the profit sector increased from 12 per cent in 1970 to 15 per cent in 1975. By 1985, their share of total employment is estimated to increase to 20 per cent. In the non-profit sector, persons with less than a college degree increased their employment share by one per cent between 1970 and 1975, and probably will increase their share by another two per cent in the following decade. They, too, will probably be forced to fill jobs with less status.

Changing scope of jobs. The bleak prospects facing better-educated workers could change radically if the structure of jobs were to change, and additional professional and managerial jobs were created either in the profit or non-profit sectors. However, developments of the past 25 years do not render one optimistic about the restructuring of employment opportunities.

It is true that the proportion of professionals in total employment did increase during the 1960's. It stood at 11 per cent of the total in 1960, 13 per cent in 1965, and 15 per cent in 1970. In the subsequent five years, the proportion of professionals in total employment failed to increase a full percentage point. Fairly optimistic BLS projections place the proportion of professionals in total employment in 1985 at 15.7 per cent, and a somewhat less optimistic prognosis would shave the figure after the decimal point.[20] Growth in employment in education plays a crucial role in determining the number of professional openings, and no growth there is anticipated.

The proportion of managers and administrators has remained around 11 per cent of total employment for the past 15 years, after declining in the 10 years 1950 to 1960, when operators of small neighborhood stores were driven out of business. The BLS sees a small decline in the proportion of managers and administrators in the next 10 years. Our projections indicate that the decline is likely to be more serious, and the number of managers, administrators and proprietors could decline to

some 8 or 9 per cent.

The growth of services, both in the market and non-market areas, is not likely to result in a drastic restructuring of the labor force composition. The distribution of employment shares by occupation is likely to stabilize close to present levels for the next decade. Hence, it does not appear that growing numbers of educated workers will be needed to fill newly created professional and managerial jobs.

Some conclusions and more questions. If the analysis above is accepted, there is little doubt that an increasing proportion of younger, well-educated workers will be filling jobs where their postsecondary education will be of limited relevance. One should stress again that many of these jobs will be in industry and in services which are profit oriented. Hence, the recent emphasis on training students for openings in the public sector no longer needs support.

An important consequence of the presence of a large number of underutilized educated workers is that they will block merit promotion routes for persons with less impressive educational credentials. In the event that these promotions are not blocked, it is quite likely that the port-of-entry jobs for persons with some college or college degrees will deteriorate in quality even more than anticipated. The possible deterioration in the quality of these jobs under a variety of assumptions about the promotion patterns of less educated workers is the subject of a subsequent paper.

Equally important conclusions can be drawn about the movement of relative wages for persons with different levels of education. It is possible that an advanced degree will become increasingly necessary in order to obtain meaningful port-of-entry jobs, and that the four-year degree will be looked upon with less favor. An examination of the trend in earnings could give an inkling of whether this additional education is contributing to the productivity of the labor force or, as some have argued, education is merely used as a screening device by employers.

It is safe to conclude, though, that by 1985, roughly a third of college graduates will be in positions which were hitherto held by persons with less education. It is not at all clear to what extent the college graduates will preempt jobs of those who completed less than four years in college. If they do, some two-thirds of persons with some postsecondary education, but no degree, could find themselves in occupations formerly filled with high school graduates.

FOOTNOTES

[1]Special tabulations of U.S. Census data, 1960 and 1970.

[2]Unpublished Bureau of Labor Statistics labor force data, 1975.

[3]Unpublished Bureau of Labor Statistics labor force data, 1975.

William Deutermann, Educational Attainment of Workers, March 1969 and 1970, Special Labor Force Report 125, U.S.D.L., B.L.S., 1970, Table B, p. A-8.

Denis F. Johnston, "Education of Workers: Projections to 1990," Monthly Labor Review, V. 96, No. 11 (1973), Table 2, p. 24.

[4]See Table 1.

[5]See Table 2.

[6]See Table 3.

[7]See Tables 4 and 5.

[8]Bob Whitmore, "Educational Attainment of Workers, March 1975," Monthly Labor Review, V. 99, No. 2 (1976), pp. 46-48.

[9]U.S. Bureau of the Census, Current Population Reports, Series P-60, Nos. 75 and 101, "Money Income of Families and Persons in the United States," Washington, D.C.: U.S.G.P.O., 1970 and 1976. From Table 47 in No. 75, and from Table 58 in No. 101.

[10]Manpower Report of the President, transmitted to Congress April 1975, Washington, D.C.: U.S.G.P.O., 1975, Table A-1, p. 203.

[11]In 1959 and 1969 the proportion of employed persons with some college who were professionals was 21.7 and 22.1 per cent, respectively. By 1975 this figure had shrunk to 17.6 per cent.

[12]See footnote 3.

[13]R. Eckaus, "Economic Criteria for Education and Training," Review of Economics and Statistics, V. 46, 1964, pp. 181-190.

[14]L. Thurow and R. E. B. Lucas, The American Distribution of Income: A Structural Problem, Washington, D.C.: Joint Economic Committee, 1972.

[15]See Tables 6, 7 and 8.

Special tabulations were prepared for this study of the distribution of full-year workers by level of education, by sex, for selected occupations (defined in Tables 6 and 7). Mean earnings for these workers were also calculated.

[16]See Table 9.

[17]See Table 10.

[18]Kenneth A. Simon et al., Projections of Education Statistics to 1984-85, D.H.E.W., U.S.O.E., N.C.E.S., Washington D.C.: U.S.G.P.O., 1976, Table 27, p. 61 and Table 32, p. 67.

Current estimates of BLS are:

Teachers	1974	Pupil/Teacher	1985	Pupil/Teacher
Kindergarten	191	10	215	14
Elementary	1,299	26	1,463	21
Secondary	1,189	13	1,090	12
College	768	10	1,077	8
Miscellaneous	96	n.a.	139	n.a.
Administrators				
Elementary and Secondary	209	.68	280	.11
College	502	.27	910	.84

[19]See Table 11.

[20]See Table 12.

TABLE 1

EMPLOYMENT BY INDUSTRY GROUPS, 1950, 1960, 1970, TOTAL, PROFESSIONAL, TECHNICAL AND KINDRED WORKERS, AND MANAGERS AND PROFESSIONALS, ETC., LESS ENGINEERS AND SCIENTISTS SUPPORTED DIRECTLY BY RESEARCH AND DEVELOPMENT FUNDS
(thousands)

	Total Employment			Professionals and Managers		
	1950	1960	1970	1950	1960	1970
Agriculture, Construction and Mining	11,575	9,163	8,138	563	763	857
Change		-2,412	-1,025		+200	+94
Manufacturing	12,930	15,826	16,502	1,258	2,107	2,601
Change		+2,896	+676		+849	+494
Services	26,037	31,888	40,347	5,656	7,207	9,080
Change		+5,851	+8,459		+1,551	+1,873
Market	24,022	28,407	34,921	4,529	5,542	6,758
Change		+4,385	+6,514		+1,013	+1,216
Non-Market	2,015	3,481	5,426	1,127	1,665	2,322
Change		+1,466	+1,945		+538	+657
Education and Public Administration	4,669	6,871	10,387	2,124	3,342	5,144
Change		+2,202	+3,516		+1,218	+1,802
Education	2,117	3,542	6,171	1,560	2,476	3,993
Change		+1,425	+2,629		+916	+1,517
Public Administration	2,552	3,329	4,216	564	866	1,151
Change		+777	+887		+302	+285
Total	55,211	63,748	75,374	9,601	13,419	17,682
Change		+8,537	+11,626		+3,818	+4,263

Source: U. S. Bureau of the Census, Decennial Census, 1950, 1960.

U. S. Bureau of the Census, Census of Population: 1970, Occupation By Industry, Final Report PC(2)-7C, U.S.G.P.O., Washington, D.C., 1972.

TABLE 2

TOTAL NUMBER OF PERSONS AND PERSONS WITH FOUR OR MORE YEARS OF COLLEGE, EMPLOYED, BY INDUSTRY GROUP, 1960, 1970, 1975
(thousands of persons)

	1960			1970		
	Total Employed	Per Cent With 4+ Years College	College Graduates Employed	Total Employed	Per Cent With 4+ Years College	College Graduates Employed
Total	64,639	9.5	6,139	76,554	13.1	10,012
Agriculture, Mining and Construction	8,819	3.2	282	8,043	4.6	370
Manufacturing	17,514	6.2	1,086	19,837	7.8	1,547
Market Services	25,931	6.8	1,763	32,529	8.7	2,830
Non-Market Services (Includes Public Administration)	9,767	30.8	3,008	16,145	32.6	5,265

TABLE 2 (Cont'd)

TOTAL NUMBER OF PERSONS AND PERSONS WITH FOUR OR MORE YEARS OF COLLEGE, EMPLOYED, BY INDUSTRY GROUP, 1960, 1970, 1975
(thousands of persons)

	1975		
	Total Employed	Per Cent With 4+ Years College	College Graduates Employed
Total	79,736	16.9	13,466
Agriculture, Mining and Construction	7,464	6.9	515
Manufacturing	18,226	10.5	1,914
Market Services	32,551	10.2	3,320
Non-Market Services (Includes Public Administration)	21,495	35.9	7,717

Source: Special tabulations of the U. S. Census, 1960.

U. S. Bureau of the Census, Census of Population: 1970, Vol. 1, Characteristics of the Population, Part 1, United States Summary--Section 2, U.S.G.P.O., Washington, D. C., 1973.

William Deutermann, Educational Attainment of Workers, March 1969 and 1970, Special Labor Force Report 125, U.S.D.L., B.L.S., 1970.

Unpublished Bureau of Labor Statistics labor force data.

TABLE 3

DISTRIBUTION OF INCREASE IN NUMBER OF WORKERS WITH FOUR OR MORE YEARS OF COLLEGE, BY INDUSTRY GROUP, 1960/70, 1970/75
(per cent)

	1960/70	1970/75
Total	100.0	100.0
Agriculture, Mining, Construction	2.3	4.2
Manufacturing	11.9	10.6
Market Services	27.5	14.2
Non-Market Services (Includes Public Administration)	58.3	71.0

Source: See Table 2.

TABLE 4

ACTUAL AND PROJECTED LABOR FORCE WITH 16+ YEARS OF EDUCATIONAL ATTAINMENT BY AGE AND SEX, 1960, 1970, 1975, 1985
(thousands of persons)

Male	1960	1970	1975	1985	
Under 24	314	651	777	811	
25 - 34	1,596	2,253	3,572	4,227	
35 - 44	2,179	1,935	2,268	4,086	
45 - 54		1,358	1,875	2,440	
55 - 64	449	717	805	1,617	
65+	188	221	320	443	
Total	4,726	7,135	9,617	13,624	
Female				(Low)	(High)
Under 24	231	583	865	1,246	1,261
25 - 34	500	920	1,866	2,577	3,100
35 - 44	915	630	876	1,895	2,187
45 - 54		568	794	1,122	1,122
55 - 64	262	428	439	683	787
65+	87	111	78	150	1,017
Total	1,995	3,240	4,918	7,673	9,474
Both Sexes, Total	6,721	10,375	14,535	21,297	23,098

Source: U. S. Bureau of the Census, Census of Population: 1970, Subject Reports, Final Report PC(2)-6A, Employment Status and Work Experience, U.S.G.P.O., Washington, D. C., 1973.

See Table 2.

TABLE 5

ACTUAL AND PROJECTED LABOR FORCE WITH 13-15 YEARS OF EDUCATIONAL ATTAINMENT BY AGE AND SEX, 1960, 1970, 1975, 1985
(thousands of persons)

Male	1960	1970	1975	1985	
Under 24	960	1,904	2,392	3,701	
25 - 34	1,284	1,712	2,536	4,436	
35 - 44	1,916	1,253	1,391	2,808	
45 - 54		1,101	1,272	1,448	
55 - 64	452	631	721	1,080	
65+	193	175	170	279	
Total	4,805	6,776	8,482	13,752	
Female				(Low)	(High)
Under 24	659	1,461	2,043	2,069	2,473
25 - 34	592	782	1,396	1,655	1,992
35 - 44	1,160	661	793	1,476	1,769
45 - 54		672	759	835	944
55 - 64	335	429	480	629	666
65+	117	127	112	210	970
Total	2,863	4,132	5,583	6,874	8,814
Both Sexes, Total	7,668	10,908	14,065	20,626	22,566

Source: See Table 4.

TABLE 6

DISTRIBUTION OF ALL FULL-YEAR WORKERS BY EDUCATION, OCCUPATION, AND SEX, 1959, 1969
(per cent)

1969	Professionals			Semi-	Managers		White	Blue	
	Modern	Classic	Total	Professional	Employed	Self-Employed	Collar	Collar	Total
Males									
12 years or less	18.7	19.0	18.8	55.6	49.7	66.7	64.9	90.7	72.4
13-15 years	18.3	15.3	17.2	32.4	21.2	18.4	21.4	7.5	13.0
16+ years	63.0	65.7	64.0	12.0	29.1	14.8	13.7	1.8	14.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Females									
12 years or less	43.7	19.2	31.1	51.9	65.9	77.3	79.3	93.9	78.2
13-15 years	31.0	17.0	23.9	28.6	19.0	15.5	17.4	5.2	13.8
16+ years	25.3	63.8	45.0	19.5	15.1	7.2	3.3	0.9	8.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1959									
Males									
12 years or less	19.9	17.8	19.2	53.4	58.4	75.0	70.7	93.2	78.0
13-15 years	17.6	13.5	16.1	27.3	19.8	15.0	18.0	5.3	10.5
16+ years	62.5	68.7	64.7	19.3	21.8	10.0	11.3	1.5	11.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Females									
12 years or less	45.6	20.1	33.2	49.3	71.8	82.4	82.7	95.6	82.4
13-15 years	33.2	19.0	26.3	25.1	18.0	12.6	14.1	3.7	11.4
16+ years	21.2	60.9	40.4	25.6	10.2	5.0	3.2	0.7	6.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Special tabulations of the U. S. Census, 1960, 1970.

TABLE 7

DISTRIBUTION OF FULL-YEAR WORKERS, AGE 16-29, BY EDUCATION, OCCUPATION AND SEX, 1959, 1969
(per cent)

1969	Professionals			Semi-	Managers		White	Blue	
	Modern	Classic	Total	Professional	Employed	Self-Employed	Collar	Collar	Total
Males									
12 years or less	15.4	17.1	16.2	51.8	47.4	60.4	60.0	86.4	69.9
13-15 years	23.0	20.3	21.8	38.7	28.8	26.0	27.8	11.8	17.7
16+ years	61.6	62.6	62.0	9.5	23.8	13.6	12.2	1.8	12.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Females									
12 years or less	32.4	14.4	22.2	43.9	54.8	73.2	73.9	88.7	70.6
13-15 years	35.7	18.4	26.0	35.9	25.2	16.2	22.9	10.0	19.9
16+ years	31.9	67.2	51.8	20.2	20.0	10.6	3.2	1.3	9.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1959									
Males									
12 years or less	14.1	17.5	15.4	53.3	53.5	68.1	67.9	91.3	77.1
13-15 years	20.3	17.1	19.1	32.6	24.0	19.4	21.5	7.3	12.9
16+ years	65.5	65.4	65.5	14.1	22.5	12.5	10.6	1.4	10.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Females									
12 years or less	35.2	15.9	26.6	41.7	69.4	82.0	83.8	93.9	80.3
13-15 years	44.9	19.5	33.6	31.4	17.7	8.0	14.0	5.4	13.7
16+ years	19.9	64.6	39.8	26.9	12.9	10.0	2.2	0.7	6.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Special tabulations of the U. S. Census, 1960, 1970.

TABLE 8

DISTRIBUTION AND MEAN WAGES OF FULL-YEAR WORKERS WITH 16+ YEARS EDUCATIONAL ATTAINMENT BY OCCUPATION, SEX AND AGE, 1959, 1969
(per cent)

	Distribution								
	Professional			Semi-	Manager		White	Blue	
Males	Modern	Classic	Total	Professional	Employed	Self-Employed	Collar	Collar	Total
1969									
All Ages	33.4	21.5	54.9	1.7	18.9	3.4	13.9	7.2	100.0
16-29 Years Old	33.2	25.9	59.1	2.5	12.3	1.1	16.2	8.8	100.0
1959									
All Ages	32.7	19.8	52.5	4.2	16.2	4.1	15.0	8.0	100.0
16-29 Years Old	33.3	20.7	54.0	6.0	11.0	1.7	19.1	8.2	100.0
Females									
1969									
All Ages	18.0	47.5	65.5	3.0	7.0	1.1	19.1	4.3	100.0
16-29 Years Old	18.5	50.6	69.1	4.0	4.5	0.2	18.2	4.0	100.0
1959									
All Ages	16.1	43.6	59.7	5.1	5.6	1.7	23.3	4.6	100.0
16-29 Years Old	17.4	45.2	62.6	8.6	3.2	0.3	22.2	3.0	100.0

TABLE 8 (Cont'd)

DISTRIBUTION AND MEAN WAGES OF FULL-YEAR WORKERS WITH 16+ YEARS EDUCATIONAL ATTAINMENT BY OCCUPATION, SEX AND AGE, 1959, 1969
(dollars)

	Wages								
	Professional			Semi-	Manager		White	Blue	
Males	Modern	Classic	Total	Professional	Employed	Self-Employed	Collar	Collar	Total
1969									
All Ages	16,713	12,932	15,232	12,178	17,220	19,749	13,307	10,396	15,093
16-29 Years Old	10,380	8,206	9,427	8,210	10,371	13,437	9,081	7,549	9,339
1959									
All Ages	10,391	7,695	9,373	7,964	11,130	11,502	7,859	6,880	9,260
16-29 Years Old	6,379	4,945	5,829	5,040	6,504	7,571	5,671	5,152	5,798
Females									
1969									
All Ages	9,329	7,547	8,037	7,459	9,649	9,411	5,787	5,106	7,591
16-29 Years Old	7,774	6,475	6,823	6,786	7,819	9,947	5,400	4,835	6,537
1959									
All Ages	5,308	4,508	4,723	4,883	5,383	4,406	3,753	3,063	4,461
16-29 Years Old	4,113	4,051	4,068	4,087	4,720	4,640	3,767	3,441	4,007

Source: Special tabulations of the U. S. Census, 1960, 1970.

TABLE 9

DISTRIBUTION AND MEAN WAGES OF FULL-YEAR WORKERS WITH 13-15 YEARS EDUCATIONAL ATTAINMENT BY OCCUPATION, SEX AND AGE, 1959, 1969
(per cent)

	Distribution								
	Professional			Semi-	Manager		White	Blue	
Males	Modern	Classic	Total	Professional	Employed	Self-Employed	Collar	Collar	Total
1969									
All Ages	11.0	5.7	16.7	5.3	15.5	4.8	24.6	33.1	100.0
16-29 Years Old	8.7	5.9	14.6	7.1	10.4	1.5	25.8	40.6	100.0
1959									
All Ages	10.1	4.3	14.4	6.4	16.2	6.7	26.1	30.2	100.0
16-29 Years Old	8.1	4.2	12.3	10.9	9.1	2.1	30.2	35.4	100.0
Females									
1969									
All Ages	12.7	7.3	20.0	2.5	5.1	1.4	57.5	13.5	100.0
16-29 Years Old	9.9	6.6	16.5	3.4	2.7	0.2	63.0	14.2	100.0
1959									
All Ages	13.7	7.4	21.1	2.7	5.3	2.3	56.2	12.4	100.0
16-29 Years Old	17.1	5.9	23.0	4.3	1.9	0.1	59.9	10.8	100.0

TABLE 9 (Cont'd)

DISTRIBUTION AND MEAN WAGES OF FULL-YEAR WORKERS WITH 13-15 YEARS EDUCATIONAL ATTAINMENT BY OCCUPATION, SEX AND AGE, 1959, 1969
(dollars)

	Wages								
	Professional			Semi-	Manager		White	Blue	
Males	Modern	Classic	Total	Professional	Employed	Self-Employed	Collar	Collar	Total
1969									
All Ages	11,447	9,984	10,949	9,955	12,796	15,061	9,751	8,308	10,211
16-29 Years Old	8,442	6,691	7,732	7,503	8,227	10,364	6,591	6,404	6,974
1959									
All Ages	7,685	6,709	7,395	6,594	9,034	9,303	6,355	5,467	6,884
16-29 Years Old	5,618	4,338	5,178	4,956	5,503	7,072	4,388	4,219	4,642
Females									
1969									
All Ages	6,700	5,577	6,289	6,098	7,134	6,974	4,935	4,167	5,270
16-29 Years Old	6,355	4,798	5,732	5,456	6,019	6,366	4,401	3,832	4,622
1959									
All Ages	3,578	3,382	3,509	3,717	4,742	3,223	3,380	2,386	3,361
16-29 Years Old	2,817	2,627	2,768	3,056	3,979	N.A.	3,087	2,142	2,926

Source: Special tabulations of the U. S. Census, 1960, 1970.

TABLE 10

EMPLOYMENT FOR PERSONS WITH FOUR OR MORE AND 1-3 YEARS OF COLLEGE BY INDUSTRY GROUP, ACTUAL 1970, 1975, PROJECTED 1985 (a) WITH 1970 PROPORTIONS, (b) WITH 1975 PROPORTIONS, (c) WITH PROJECTED PROPORTIONS
(thousands)

	Four or More Years					13 - 15 Years					Total Civilian Employment
	1970	1975	1985			1970	1975	1985			
			a	b	c			a	b	c	1985
Agriculture, Mining, Construction	370	515	463	684	956	676	933	845	1,248	1,691	10,663
Manufacturing	1,547	1,914	1,792	2,413	3,801	2,023	2,388	2,282	2,930	4,825	22,370
Profit Services	2,830	3,320	3,993	4,636	7,126	4,782	5,469	6,747	7,711	9,498	45,463
Sub-Total	4,747	5,249	6,248	7,733	11,884	7,481	8,790	9,874	11,889	16,014	78,496
Non-Profit Services											
Ex Education	1,261	2,516	2,430	3,060	4,275	1,012	1,785	1,958	2,171	2,835	11,251
Education	3,421	4,367	4,251	4,367	4,582	909	1,021	1,132	1,011	1,011	7,638
Government	583	834	856	1,111	1,543	775	1,042	1,135	1,388	1,813	6,170
Sub-Total	5,265	7,717	7,537	8,538	10,399	2,696	3,848	4,225	4,570	5,659	25,059
Total	10,012	13,466	13,785	16,271	22,243	10,177	12,368	14,099	16,459	21,673	103,555

Source: William Deutermann, Educational Attainment of Workers, March 1969 and 1970, Special Labor Force Report 125, U.S.D.L., B.L.S., 1970, Table I, p. A-15.

Unpublished Bureau of Labor Statistics labor force data.

TABLE 11

ACTUAL AND PROJECTED SHARES OF EMPLOYMENT BY INDUSTRY OF PERSONS WITH FOUR OR MORE YEARS AND 1-3 YEARS OF COLLEGE, ACTUAL 1970, 1975, AND PROJECTED 1985
(per cent of employed)

	Four Plus Years			Less Than Four Years		
	1970	1975	1985	1970	1975	1985
Agriculture, Mining & Construction	4.6	6.9	9.5	8.4	12.5	16.8
Manufacturing	7.8	10.5	17.0	10.2	13.1	19.1
Profit Service	8.7	12.2	15.5	14.7	16.8	20.7
Sub-Total	7.9	9.9	15.1	12.3	15.1	20.4
Non-Profit Services Ex Education	21.6	27.3	38.0	17.4	19.3	25.2
Education	55.9	57.2	60.0	14.9	13.3	13.2
Government	13.9	18.0	25.0	18.4	22.5	29.4
Sub-Total	32.6	35.9	34.1	16.7	17.9	22.4
Total	13.2	16.9	22.4	13.2	15.9	20.9

Source: See Table 10.

TABLE 12

ESTIMATES OF DISTRIBUTION OF EMPLOYED PERSONS BY OCCUPATION FOR 1985, BLS AND THIS STUDY

	BLS	This Study	BLS	This Study
	(millions)		(per cent)	
Professional	15,967	15,400	15.4	14.9
Managers and Administrators	10,871	10,400	10.5	10.1
Clerical	20,122	19,000	19.5	18.4
Sales	6,268	6,000	6.1	5.8
Craftsmen	13,760	15,100	13.3	14.6
Operatives	15,178	16,200	14.7	15.7
Service Workers	14,562	14,600	14.1	14.1
Laborers	4,767	4,800	4.6	4.6
Farmers	1,860	1,900	1.8	1.8
Total	103,355	103,400	100.0	100.0

Source: See Table 10.
See footnote 18.

APPENDIX A

ESTIMATES OF DEMAND AND SUPPLY FOR LABOR BY LEVEL OF EDUCATION

The estimates of demand and supply are prepared in many steps. Each one of these steps is subject to some error. This Appendix describes and evaluates recent forecasts.

Population of working age. The first step in the preparation of labor force estimates is an estimate of the population of working age, generally defined as all persons 16 years of age and over. Projections for the next ten years are not likely to be very wrong on this count. Everyone who is likely to enter the labor force by 1985 is already born, and no drastic changes in the death rates are expected. The principal source of error in these forecasts would be incorrect projections of immigration and emigration, but these are not likely to amount to more than a 1.0 - 1.5 per cent error in estimates of the labor force 10 years from now.

Labor force participation rates.[1] Much more uncertainty surrounds the projection of labor force participation rates. While all but one or two per cent of males aged 25 to 55 are likely to be in the labor force, the participation of younger males, aged 16 to 25, is affected by their propensity to graduate from high school and enroll in college. High school graduation rates have remained relatively constant in the past 10 years, and so have the labor force participation rates of males aged 16 and 17. However, the labor force participation rates of males aged 18

to 25 have fluctuated with changes in college enrollments. For men above age 55, the propensity to work or seek work has been declining steadily; it declined especially steeply in the past few years. There are differences of opinions with respect to this trend, with some experts ascribing it to better pension coverage and others to discouragement, since many older workers despair to find jobs in a period of high unemployment. Subjective decisions about how to extrapolate past trends in college enrollments and in older workers' withdrawal can affect the accuracy of forecasts of the labor force.

The uncertainty in forecasts of labor force participation rates is even greater in the case of women. Women's propensity to work has changed over time much more widely than that of men. In the past five years, for instance, a higher proportion of women aged 16 to 19 was in the labor force than in the preceding five years. The proportion of women aged 20 to 24 in the labor force also increased dramatically. That of older women increased, but not as much. Delayed marriages, fewer children, and the economic pressures on families due to higher unemployment and lower real earnings of males have been cited by some as reasons for the higher proportion of women seeking jobs. Others have argued that the increased propensity of women to work depends more on a "cultural revolution."

Since no one has perfected the art of forecasting birth rates ten years in advance, and since the effect of other factors on the

participation of women in the labor force has been imperfectly quantified, it is quite possible that serious errors could plague forecasters of the numbers of women in the labor force. In the past, the female labor force has been consistently underestimated.

Ironically, the methodological weaknesses in the forecasting of labor force participation by sex have served to cancel each other out, and recent overall forecasts of labor force participation have proved to be surprisingly accurate. The progress in this field has been quite impressive. Recent labor force projections have erred by roughly two per cent of the total labor force, as contrasted to an early forecast by Durand, prepared in 1948, which missed the mark by 15 per cent. By 1952, the projection prepared by the U.S. Bureau of the Census for 1965 missed the actual figure by one-half of one per cent. Subsequent projections by Cooper and Garfinkle, prepared in 1959, overestimated the labor force in 1970 by 1.5 per cent, and a projection by Cooper and Johnson prepared in 1965 came within 2.0 million persons of the 1975 labor force figure, an error of less than three per cent. With less unemployment and fewer discouraged workers in that year, they would have erred even less.[2]

The difference between early and very recent revisions of the labor force projections by the Bureau of Labor Statistics for both 1980 and 1985 is about two per cent.[3] These upward revisions are accounted solely by revisions in the estimated number of women participating in the labor force. As our discussion below will indicate, it is probable that these

forecasts will underestimate the total labor force, since the upward revisions are not as high as they ought to be.

Numbers of persons with postsecondary education, and their labor force participation rate. Much less has been published about the number of persons likely to attain a given level of education, and even less about their labor participation rates. The latest forecast by the U.S. Bureau of the Census of educational attainment of the population for 1985 was published in 1968. Since that time, the attendance rates have changed quite substantially, especially for women, and the projections for the younger age groups are not as accurate as could be desired. No recent estimates of the stock of educated manpower have been published by BLS. The BLS's most recently published detailed estimates of labor force participation by education date from 1973.[4] An informal estimate, from a work sheet of the Bureau of Labor Statistics, places the number of employed college graduates some 10 per cent higher than would be inferred from the 1973 estimates.[5]

Because of recent changes in enrollment trends, new estimates were prepared specially for this study of the stock of (1) persons with some postsecondary education, and (2) persons with college degrees both by sex and by selected age groups. Also different estimates of participation were also prepared and the labor force with postsecondary education was estimated by applying them to the results of step (1).

Our estimates of the stock of manpower with 13 to 15 years

of education and with college degrees are based upon (1) statistics for the period 1960-75 for first-time enrollment and projections for subsequent years, from the National Center for Educational Statistics, (2) estimates of bachelor's degrees granted, from the same source, and (3) recent information from the Current Population Survey about the numbers of persons with this level of education and their labor force participation in 1970 and 1975.

These three series were used (1) to estimate the proportion of first-time enrollees not likely to complete one year of postsecondary education, and (2) to distribute the rest of the enrollees by age group, including both those who stopped short of four years of education and those who completed four years and are, for the purpose of this study, presumed to have received a bachelor's degree. (See footnote 7 in text and Tables 4-5.)

The procedure is admittedly crude, since it does not take into account the emigration of degree recipients to foreign countries, nor the immigration of persons with college education from abroad. However, the errors introduced by the procedure are small, on the order of some 2.5 per cent, as shown by Adkins in his study of the stock of degree recipients in the U. S.[6]

Much higher errors are probably inherent in the estimate of the labor force participation of persons with some postsecondary education. In line with current BLS practice, we have not changed the labor force participation of men. In the case of women, we prepared two

forecasts, one based on current rates and another, higher, projection based upon estimates prepared for us by a demographer who specializes in labor force studies.

Our low estimate places the share of persons with some college education at 20.4 per cent of the total employment in 1985, up from 17.0 (BLS) per cent in 1975. Our high estimate places their number at 1.9 million more, and their share at 22.5 per cent of the total.[7] The low estimate of college graduates in the labor force is about equal to the one used by the Bureau of Labor Statistics. The high estimate is 1.1 million more, and about 1.1 per cent higher, than the one which has been adopted by that organization.

Summary. If the past is any guide to the future, projections of labor force by education ten years ahead are not likely to miss the target by more than five per cent. In the past, estimates of persons with above average education were too low, and this study bent over backwards to make optimistic assumptions about the propensity to work by persons with postsecondary education.

THE DEMAND FOR EDUCATED MANPOWER

It may come as a surprise to the non-specialist that the same set of figures used to estimate the supply of manpower is then used to estimate the demand. Once again a number of steps are used to arrive at these estimates, and these are described below.

The Gross National Product and Industry Employment. Given

the size of the civilian employment and an estimate of the average increase in productivity per worker, an estimate of the gross national product is prepared. This amount is then allocated to different industrial sectors, and industry-by-industry product is estimated. The sub-totals by industry are then adjusted to arrive at the pre-determined civilian employment which was projected earlier.

In the past, projections of trends worked much better than projections based upon judgement, and these were continued by the BLS when it prepared the figures for 1985, published early this year. Alternative projections of GNP are in the works, using the input-output matrix of the U. S. Department of Commerce.

Errors in BLS projections of employment by industry cannot be readily estimated, especially for the next ten-year period. Not only have there been drastic changes in the relative price of energy recently, making the next ten years quite different from the past ten, but also demographic developments, such as the decrease in the school-age population, are quite likely to make mere extensions of past trends misleading. More will be said on this subject later.

Projections of the labor force by occupation. Some 220 industry projections are used to build up the demand for manpower by occupation for a future time period. The proportion of workers in each of some 441 categories is trended as a percentage of those employed in each industry, and the estimates are then aggregated to produce employment by occupation.

These estimates are susceptible to three types of errors: (1) errors due to incorrect estimates of employment by industry, (2) errors due to the trend fitting adopted, involving, for example, the over- or under-emphasis of recent developments, and (3) errors due to the failure to take into account the substitution of one occupation for another in response to changing relative wages or, perhaps, the substitution of a particular type of labor by capital.

These errors could be more serious in the future than they were in the past, and a considerable amount of judgement by the professionals in the Bureau of Labor Statistics goes into "adjusting" forecasts derived by statistical methods.

In summary, the history of projections by occupation is a short one. The first projections of broad occupational groups (i.e., professionals, managers, white- and blue-collar workers) appeared in the Manpower Report of the President in 1964. [8] The projection for 1970 overestimated the employment of managers by 300 thousand and underestimated the employment of professionals by 400 thousand persons. In total, its estimate of the two occupations, which accounted for the lion's share of employment to persons with postsecondary education, was fairly accurate. The projection for 1975 was less on target: it estimated professional employment at 15.4 million, though actual employment was only 13.0 million persons. This time the number of employed managers was also overestimated, at 9.5 million, when their actual employment was only 8.8 million. Even

if the projections were decreased by five per cent, to allow for the higher-than-average unemployment in 1975, it would appear that the method used by BLS still consistently overestimates professional employment.[9]

The lessons of past forecasts have been taken to heart by BLS. In 1973, published estimates of the employment of professionals put the figure at 17 million for 1985. Current updated forecasts have lowered the figure by one million. By contrast, the BLS estimate of the employment of managers has been revised slightly upward from 10.5 million to 10.9 million for 1985.

Despite the considerable expertise of individual forecasters who were involved in the BLS estimates, this writer still believes that the BLS forecasts for high-status occupations are too high. They were based on the trends of the 1950's and 1960's and ignore the interaction of labor and capital in supporting both professional and managerial occupations. During the past two decades, the introduction of data-processing machinery dramatically improved the productivity of these two occupations. It also resulted in the reassignment of a number of blue-collar and lower-white-collar clerical tasks in the profit sector to professionals and managers. In the course of the next ten years, however, as a number of these professional and managerial techniques become institutionalized, data-processing equipment may well cut into the number of higher-status workers who are needed to provide the service. In other words, machines will, increasingly, replace manpower in these two occupations, as in many mature industries.

Current BLS projections are too high, in our opinion, in the employment of both professionals and managers in education. When current employment projections for 1985 are coupled with accepted forecasts of elementary and secondary school enrollments, they imply a decline of the student/teacher ratio from the current figure in elementary education of 26 to 21, and 13 to 12 in secondary education. In higher education, the student/teacher ratio is also projected to decline from the current level of 10 full-time equivalent students to 7.6.[10] What is even more disturbing in the forecasts is the projected rapid increase of higher education managers and administrators in relation to teachers. They are projected to increase from .5 million in 1974 to .9 million in 1985. Were one to assume that the number of instructors and administrators would remain constant in the face of unchanging enrollment levels during these two years, the BLS forecast of employment of professionals would have to be decreased by .6 million, and that of managers and administrators by .5 million.

Employment of persons by educational levels. The BLS passes no value judgement upon the suitability of jobs for persons with postsecondary education. It merely estimates the distribution of persons with, say, college degrees by occupation group.

One understands the BLS's reticence, since estimates of job prospects for college graduates have not had a happy history. In 1949, Seymour E. Harris published a slim volume which contained a prediction that college graduates in the 1960's would no longer be able to find suitable

jobs.[11] Professor Harris' projections were wrong on all counts: he underestimated the number of college graduates in the labor force, and underestimated even more drastically the number of suitable job openings.

In fairness to Harris, it should be stressed that his work was based on fragmentary information dating mostly from the late 1930's and early 1940's. The data of the war years did not seem suitable to projecting trends for a peace-time period, at least in the immediate post-World-War-II intellectual climate. Thus projections for some 15-20 years ahead were based on information which was 10 years old.

It is instructive to analyze where Harris went wrong. He failed to foresee the fast growth of the U. S. economy at a rate that had not been experienced since the 1920's. He also failed to estimate correctly the willingness of the American electorate to pay for more education and an array of social services. And finally, to add insult to injury, Harris underestimated the propensity of American youths to enroll in postsecondary education.

In the first 20 years which followed the publication of Harris' book, there was more talk of shortages than of surpluses of college graduates and other highly educated personnel. This talk of shortages did not sit well with economists, who claimed that shortages of teachers, nurses, etc., were caused more by the low wages in certain occupations than by a true absence of qualified applicants. Nevertheless, observers criticized

the caliber of recruits for certain occupations, or bemoaned the fact that an insufficient numbers of city planners, health professionals or engineers were available to fill existing vacancies.

An attempt to reconcile the popular conception of a shortage with the need for some intellectual rigor was finally made by Bank and Stigler[12] who, in the late 1950's, defined shortages to mean that the supply of applicants for a given occupation increased more slowly than the number of persons demanded at salaries paid in the recent past. Even with this conservative definition, many reputed shortages could not be documented.

Most policy discussions did not pay attention to the few, carefully hedged prognoses about the possibility of a surplus of college graduates. Thus, Folger and Nam,[13] writing in the early 1960's, pointed out that the trends of the 1950's and 1960's would have to extend to the 1970's for college graduates to find suitable jobs. They noted that the demand for teachers in elementary and secondary education was likely to slacken, and cautioned policy analysts that employment problems might be in store for the highly educated.

In the late 1960's, disagreeing with BLS projections of the number of professional workers, A. J. Jaffe and the present writer also forecast an oversupply of college graduates and of other persons with postsecondary education by 1975.[14] This opinion was not widely shared either.

The mainstream opinion was expressed by Dael Wolfle in 1970, in an introduction to the research report by Folger, Austin and Bayer.

Wolfle believed that in the next decade, a quarter to a third of college graduates would find employment in jobs which were not hitherto filled by persons with this level of education. Instead of viewing this development with alarm, he labelled this development as an opportunity to "upgrade" the educational level in some occupations.

The extent of the "upgrading" of occupations began to concern the BLS in 1972. In that year, the Bureau estimated that the 15.9 million college graduates likely to be employed in 1980 will exceed the number of suitable openings.[15] More recently, in a projection for 1985, the BLS estimated that of the 20.4 million college graduates likely to be employed that year, only 75 per cent will find professional or managerial jobs.[16] The forecast implies a deterioration in the quality of jobs, since in 1970, 85 per cent of all college graduates were in professional or managerial jobs, and 78 per cent, in 1975, were found in those occupations.

Most academic observers would agree with the prognosis that college graduates will increasingly fill jobs with less content. But they are not willing to gauge the extent or the seriousness of the problem. As early as 1973, the Carnegie Commission on Higher Education published a policy paper acknowledging the possible imbalance between graduates and jobs.[17] The 1974 research volume, on which the policy document was based, concluded with a chapter by its editor, Margaret Gordon, who summarized over 600 pages of discussion in an unexceptionable manner. Dr. Gordon believes that the demand/supply relationship in the labor

market is not entirely clear, and that if enrollments do not decline sufficiently, or some unforeseen event does not increase the demand for college graduates, some surplus is likely to occur. If on the other hand. . .[18]

R. B. Freeman has been in the minority of academic economists who decry the surplus of college graduates. Noting the slower growth in the incomes of younger persons with four or more years of education compared to those of other groups, Freeman has raised the issue that Americans are overeducated for the demands of the marketplace.[19] Another classically-oriented economist, S. Dresch, has extended Freeman's findings to explain the recent decline in the proportion of high school graduates enrolling in higher education, and has projected large declines[20] in future enrollments.

It is possible to argue with Freeman and Dresch because their data and models are not as precise or sophisticated as one would wish. For instance, Freeman's findings about the surplus of current graduates are based on his calculation of the declining rate of return on postsecondary education. Unfortunately, he does not take into account the considerably smaller investment of part-time students, who constitute an increasing portion of the postsecondary enrollment. In the case of Dresch, his model was meant to stimulate further research rather than provide a definitive forecast.

Even if enrollments declined by a third, as postulated by Dresch, the number of graduates would only be reduced by 3 million, and the balance

between demand and supply is not likely to be restored by 1970 or 1975 standards. The enrollments are not likely to decline as drastically, since education, in all probability, is both a consumption and an investment good.

APPENDIX FOOTNOTES

[1]A. J. Jaffe and Joseph Froomkin, Technology and Jobs, New York: Frederick A. Praeger, 1968. See especially Appendix C, "The Savvy Soothsayer, or the Art of Fabricating Labor Force Projections."

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Sophia Cooper and Denis F. Johnston, "Labor Force Projections for 1970-80," Monthly Labor Review, Vol. 88, No. 2 (February 1965), Table 1, p. 130.

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[5]Unpublished Bureau of Labor Statistics labor force data, 1975.

[6]Douglas L. Adkins, "The American Educated Labor Force: An Empirical Look at Theories of Its Formation and Composition," Higher Education and the Labor Market, Margaret S. Gordon, ed., New York: McGraw-Hill Book Co., 1974, pp. 111-146.

[7]See footnote 3.

[8]Manpower Report of the President, transmitted to Congress April 1964, Washington, D. C.: U.S.G.P.O., 1964.

[9]Bob Whitmore, Educational Attainment of Workers, March 1975, Special Labor Force Report, U.S.D.L., B.L.S. (to be published).

[10]Idem.

[11]Seymour E. Harris, The Market for College Graduates, Cambridge, Mass.: Harvard University Press, 1949.

[12]David M. Blank and George J. Stigler, The Demand and Supply of Scientific Personnel, New York: National Bureau of Economic Research, 1957.

[13]John K. Folger and Charles B. Nam, Education of the American Population, Department of Commerce, Bureau of the Census, Washington, D.C.: U.S.G.P.O., 1967.

[14]Jaffe and Froomkin, op. cit., p. 158.

[15]Michael F. Crowley, "Professional Manpower: the Job Market Turnaround," Monthly Labor Review, V. 95, No. 10 (1972), pp. 9-15.

[16]Unpublished Bureau of Labor Statistics labor force data, 1975.

[17]Carnegie Commission on Higher Education, College Graduates and Jobs: Adjusting to a New Labor Market Situation, New York: McGraw-Hill Book Co., April 1973.

[18]Margaret S. Gordon, "The Changing Labor Market for College Graduates," Higher Education and the Labor Market, Margaret S. Gordon, ed., New York: McGraw-Hill Book Co., 1974, pp. 27-82.

[19]Richard B. Freeman, "Overinvestment in College Training," The Journal of Human Resources, V. 10, No. 3 (1975), pp. 287-311.

[20]Stephen P. Dresch, "Demography, Technology and Higher Education: Toward a Formal Model of Educational Adaptation," Journal of Political Economy, V. 83, No. 3 (1975), pp. 535-569.