PRODUCTIVITY, EDUCATION AND
CHANGES IN THE LABOR FORCE

by

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ABSTRACT

Productivity, Education and Changes in the Labor Force

By

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the degree of Doctor of Philosophy in Economics at the
Department of Economics of the Massachusetts Institute
of Technology

This study has attempted to determine what statistical evidence exists
for the commonly held belief that productivity increases during the postwar
period have shifted the occupational structure of the labor force away from
blue collar employment and toward the white collar occupations that tend
to require above average educational attainment.

This thesis has quantified the sequence from productivity to indus-
trial sector changes to occupational structure shifts to the relationship
between educational attainment and the change in the occupational struc-
ture of employment. The last stage of the research was an attempt to relate
the sequence from productivity to the relationship of employment with
educational attainment to the question of whether structural unemployment
had worsened during the postwar period. The period of analysis of this
study was 1948-1962, and it was emphasized that this research represented
a study of an historical period. Trends observed during this period
should not be extrapolated into the future without great caution because
of cyclical and secular considerations that should be factored into the
extrapolation.

It was found in Chapter II that increases in productivity during the
postwar period were faster than those of the long-run experience from
1899 to 1948. Those sectors of the economy with faster increases in pro-
ductivity tended to be those sectors of the economy with smaller increases
in employment. This resulted in a shift in employment toward the non-goods
sectors of the economy.

These industrial sector shifts were related to shifts in the occupa-
tional structure in Chapter III. It was found that the occupational struc-
ture evolved toward the white collar occupations more consistently and
at a faster rate during the postwar period than was the case in the longer
run period, 1900-1950. The relationship between the industrial and
occupational structures resulted from the fact that the goods sectors
are predominantly blue collar in employment and the non-goods sectors
are predominantly white collar. The relative magnitude of the causes
in the shift from blue collar to white collar employment was quantified in
Chapter III. Two primary causes were quantified: the shift from goods to
non-goods employment and the shift from blue collar to white collar employ-
ment within the goods and non-goods sectors.

Chapter IV related the shifts in the occupational structure to the tendency of some occupations to utilize personnel with higher educational attainment than other occupations. The question of whether the structure of the supply of labor had adjusted rapidly enough to the shift in the demand for labor was then examined through an analysis of changes in the structure of labor force participation and unemployment rates. It was found that the position of members of the population with low levels of educational attainment had deteriorated over time in the postwar period. This group became a smaller proportion of the labor force over time, however, and it was therefore found that the increase in the total rate of unemployment since 1957 could not be explained by a worsening of structural difficulties. This led to the conclusion that efforts were required to alleviate the problems that had become more serious for members of the population with low levels of education, but that this need for specific structural activities did not mean that there was not ample room for aggregate demand policies. It was found that the debate over whether structural unemployment had worsened could be largely resolved through the proper specification of the problems under consideration.

Thesis Supervisor: Robert Evans, Jr.
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Acknowledgements

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CHAPTER I

INTRODUCTION

There is something ironic in the reflection
that just at the moment when civilization has,
in effect, extended itself over the whole world
and when precivilized societies exist only in
rapidly declining pockets, postcivilization is
stalking on the heels of civilization itself
and is creating the same kind of disruption and
disturbance in civilized societies that civili-
zation produces on precivilized societies.

Just as civilization is a product of the
food surplus which proceeds from agriculture,
which represents a higher level of organization
of food production than primitive hunting and
food gathering, so postcivilization is a product
of science, that is, of a higher level of human
knowledge and the organization of this knowledge
into know-how. The result of this is an in-
crease in the productivity of human labor, es-
pecially in the production of commodities,
which is quantitatively so large as to create a
qualitatively different kind of society.[1]

General Background and

Historical Perspective

"It has been said that the seasonally adjusted unemploy-

ment rate is -- at least in its political implication -- the

most important single statistic published by the Federal

Government."[2] Since 1957 the level of unemployment has been

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[1]Kenneth E. Boulding, "The Death of the City: A Frightened
Look at Postcivilization" in The Historian and the City, edited
by Oscar Handlin and John Burchard (Cambridge: The M.I.T. and
Harvard University Press, 1963), pp. 138-39.

[2]Measuring Employment and Unemployment, President's Com-
mittee to Appraise Employment and Unemployment Statistics
(Washington, D.C.: Government Printing Office, 1962), p. 9.

above the acceptable "full" employment-unemployment rate of four percent.[1]
It has thus become a cause of concern for both the public and economists.

A nation can express a goal very much as a corporation does and then
compare its performance with its goal to evaluate progress. Output in GNP
may be compared to the sales of a corporation. The rate of unemployment
appears to be conceptually what the rate of profit is for a corporation.
Both are residues and as such are subject to the limitations of residual
analysis. Despite this warning about the accuracy of the unemployment
rate as an indicator, it does appear probable that the economy of the
United States has been running below the efficiency of other countries
when the level of unemployment is used as the measure of performance.
This information is presented in Table 1-A.

Table 1-A

Number of Unemployed and Rate of Unemployment in 1960 by
Selected Industrial Countries

(Adjusted to U. S. Definitions of Unemployment)

Country	Civilian Labor Force (millions)	Number of Unemployed (thousands)	Unemployment Rate (%)
France	19.1	370	1.9
Germany (F.R.)	25.2	245	1.0
Great Britain	23.9	570	2.4
Italy	20.9	896	4.3
Japan	43.5	480	1.1
Sweden (1961)	3.7	56	1.5
United States	70.6	3,931	5.6

Source: President's Committee to Appraise Employment and Unemployment,
op. cit., p. 255.

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[1] A 4 percent level of unemployment will be used in this research as the
"full" employment level of unemployment in the U.S. economy during the
time period under consideration (1948-1962). The CEA uses this rate in
its calculation of potential GNP [see Economic Report of the President,
1965 (Washington, D.C.: Government Printing Office, 1965), p. 83].

The unemployment rate in the United States compares unfavorably with many other countries[1] in 1960 and it compares unfavorably with other periods of time in the United States. This information is presented in Table 1-B.

It can be seen in Table 1-B that the unemployment rate of the civilian labor force for the earlier part of the postwar period, 1948-1957, approximates the rates between 1900 and 1929. However, the unemployment rate for the period 1957-1963 is noticeably higher than the 1900-1929 rates for the civilian economy. When compared with the foreign experience seen in Table 1-A, the U.S. unemployment rate is difficult to understand. In 1960, four countries enjoyed an unemployment rate of less than two percent. According to Stanley Lebergott, only twice during peacetime in the twentieth century has the United States enjoyed such a low level of unemployment.[2] Even during World War II, with all the wage and price controls that proved to be necessary, the unemployment rate fell to only 1.2 percent

[1]The lower unemployment rates in foreign countries have led to a number of interesting publications. See Lessons from Foreign Labor Market Policies, Volume 4 and The Role of Apprenticeship in Manpower Development: United States and Western Europe, Volume 3 of Selected Readings in Employment and Manpower, Compiled for the Subcommittee on Employment and Manpower, Committee on Labor and Public Welfare, U.S. Senate, 88th Congress, 2nd Session (Washington, D.C.: Government Printing Office, 1964); Employment and Economic Growth (Geneva: International Labour Office, 1964).

[2]Stanley Lebergott, Manpower in Economic Growth (New York: McGraw-Hill Book Company, 1964), p. 512.

Table 1-B

Rates of Unemployment in the United States
1900 to 1963

Average During the Period	Civilian Labor Force	Average Percent of Nonfarm Labor Force	Lebergott's "Nonfarm employees"[1]
1909-1948	8.3	10.6	13.1
1948-1963	4.9	5.4	6.4
1900-1909	4.4	6.7	9.8
1910-1919	5.0	7.0	9.4
1920-1929	4.7	6.2	7.8
1930-1939	18.4	22.9	27.6
1940-1948	5.1	6.1	7.3
1948-1957	4.3	4.8	5.6
1957-1963	5.7	6.2	7.3

Source: Stanley Lebergott, _Manpower in Economic Growth_ (New York: McGraw-Hill Book Company, 1964), p. 512. for the years 1900-1960. Statistics for years 1961-1963 were obtained from _Manpower Report of the President, 1964_ (Washington, D.C.: Government Printing Office, 1964), Table A-1, p. 195, and Table A-4, p. 197. Calculations were made by the author.

It should be noted that, although Lebergott has attempted to link his series with the Current Population Survey which began in 1940, changing definitions and alternative constructions create differences over time between different employment series. Lebergott discusses this problem on pages 356-358. It will be noted in a later section of this paper that various series react in different ways even for the postwar period, despite a marked improvement in the quality of employment statistics. The use of median rates of unemployment would have brought the more recent period up to a little higher than the long run median in the civilian labor force column, but not the nonfarm labor force (see Lebergott, p. 184). Rates for the years since 1948 have been adjusted by the changed definitions instituted in 1957 which increased the rate of unemployment by a factor of approximately 10 percent.

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[1] Lebergott attempted to present a more accurate picture over time of the incidence of unemployment by deducting from the denominator of the unemployment/labor force ratio the self employed, unpaid family workers, private household workers, and workers in agriculture. He called the result "nonfarm employees." Lebergott may have been correct that agricultural workers tend not to be unemployed in the earlier periods. However- in the postwar period, the level of unemployment of agricultural workers has been above the average rate. See Appendix C-4.

in 1944 and remained at 1.9 percent or more during the other war years.

A large proportion of the literature in labor economics during the last few years has been concerned with the rate of unemployment.[1] During this period the concept of an output gap has been formalized, and the government has become committed to narrowing the gap between actual output and potential output.[2] In order to develop a useful estimate of potential GNP, it is necessary to ascertain the quantity of available labor resources that exist and that can be employed without inordinant structural frictions, if aggregate demand is increased for the purpose of gap reduction.

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[1] Many references to this literature are given in Chapter IV when the causes of the unsatisfactory level of unemployment are analyzed.

[2] See, for example, Arthur Okun, "Potential GNP: Its Measurement and Significance," Proceedings of the Business and Economics Section of the American Statistical Association, 1962. Also, the Economic Report of the President, 1962 (Washington, D.C.: Government Printing Office, 1962), pp. 49-53.

The gap has been measured in GNP, but a primary purpose of gap reduction has been to lower the rate of unemployment to the "full" employment-unemployment rate of 4 percent.[1] The calculation of potential GNP and the estimate of the level of "full" employment-unemployment requires, therefore, an understanding of the nature of the structural difficulties in the labor force.

During the latter part of the postwar period, there has been a continuing debate among economists over the degree of structural difficulty involved in the high unemployment rates since 1957. Some economists thought that increased unemployment was caused mainly by inadequate demand, and that the postwar rate of technological change had not made structural problems more serious.[2]

Measures to reduce unemployment by increasing the level of demand have been combatted by some[3] who believe that structural conditions in the labor force have in fact changed over time in the postwar period. It has been

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[1] Ibid., p. 46.

[2] See, for example, Higher Unemployment Rates, 1957-60: Structural Transformation or Inadequate Demand, Subcommittee on Economic Statistics of the Joint Economic Committee, 87th Congress, 1st Session (Washington, D.C.: Government Printing Office, 1961).

[3] See, for example, Charles Killingsworth, in Nation's Manpower Revolution, Hearings before the Subcommittee on Labor and Public Welfare, 88th Congress, 1st Session (Washington, D.C.: September-November, 1963), pt. 5, pp. 1961-83.

held by this group that efforts to reduce the rate of un-
employment to 4 percent are unrealistic, because increased
structural difficulties have made an unemployment rate higher
than 4 percent the new level of "full" employment-unemploy-
ment. It was feared that inflation would result if a mis-
guided attempt is made to push the rate of unemployment
below the new and higher "full" employment-unemployment
level.[1]

The belief that there has been an increase in structural
unemployment has also been held by some who are very different
from conservatives who always fear government actions and
impending inflation. A sizeable body of concerned economists
and labor leaders have concluded that the rapid progress
toward automation has made a large proportion of the
labor force unfit for the new structure of the demand
for labor.[2] This idea has led to debates such as ap-
peared in an article in The New York Times Magazine
Section: "Automation: Threat and Promise."[3] The fear
that automation has been destroying the jobs that are manual
in nature and therefore have required relatively low levels
of educational attainment has fostered a public awareness
of the new importance of education. Secretary of Labor

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[1]See, for example, The Wall Street Journal, editorial of
February 27, 1964, p. 10.

[2]See, for example, Clarence Long's statement in Employ-
ment and Unemployment, Hearings before the Subcommittee on
Economic Statistics of the Joint Economic Committee, 87th
Congress, 1st Session, December 20, 1961 (Washington, D C.:
Government Printing Office, 1962), pp. 377-380.

[3]Gardner Ackley vs. John I. Snyder, "Automation: Threat
and Promise," The New York Times Magazine Section (March 22,
1964), pp. 16ff.

Wirtz has called it "economic suicide" not to graduate from high school today.[1]

The problem of the place in the labor market for those with a low level of educational attainment has become a source of concern for the nation. In response to a recent Business Week[2] survey on major domestic problems that "now must be tackled," Albert Rees replied:

> The most important problem facing the U.S. economy is the lack of education and training among an important segment of our youth. Unless we can do something about this, we can look forward for years ahead to having a recurrent problem of pockets of poverty and unemployment.

and Frank C. Pierson stated:

> As I see it, the most important current problem is the lack of general educational preparation and specific career training of millions of Americans, making it impossible for them to be active participants in our rapidly changing economy.

What has been of concern to many public officials and economists is the possibility that a large portion of the population receives inadequate education and vocational training. The magnitude of the problem can be seen in Table I-C.

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[1]The New York Times (December 17, 1963), p. 41, col. 4.

[2]"How They See the Work Ahead," Business Week (January 9, 1965), pp. 26-28.

Table I-C

Trends in Leaving School: With and Without Degrees

1947 to 1963

	High School Graduates (000's)	Bachelor's or 1st Prof. (000's)	Master's or 2nd Prof. (000's)	Doctor's or Equivalent (000's)	Retention Rate H.S. Graduates (%)	Dropouts: Year Before H.S.Grad* (000's)
1963	----	440.0	83.7	12.3	----	----
1962	1,930	420.5	84.9	11.6	63.6	1,110
1961	----	401.1	78.9	10.6	63.2	----
1960	1,864	394.9	74.5	9.8	62.1	1,380
1959	----	385.2	69.6	9.4	59.7	----
1958	1,506	365.7	65.6	8.9	58.2	1,081
1957	1,458	340.3	62.0	8.8	57.4	1,081
1956	1,415	311.3	59.3	8.9	58.1	1,020
1955	1,344	287.4	58.2	8.8	55.9	1,060
1954	1,276	292.9	56.8	9.0	55.3	1,030
1953	1,198	304.9	61.0	8.3	52.4	1,090
1952	1,197	331.9	63.6	7.7	52.2	1,095
1951	1,182	384.4	65.1	7.3	52.4	1,075
1950	1,200	433.7	58.2	6.4	50.5	1,178
1949	----	366.7	50.8	5.1	48.8	----
1948	1,190	272.3	42.4	4.0	48.1	1,282
1947	----	----	----	----	45.0	----

*May have left school even before entering high school.

Source: U.S. Department of Health, Education and Welfare, Trends, 1963 Edition (Washington, D.C.: Government Printing Office, 1963), pp. 46, 47, 48. Number of dropouts calculated from the high school retention rate and high school graduates.

It will be observed that there has been a very sig-
nificant increase in the flow of the better educated into
the labor force. Due to the demographic increase in the
number of teenagers during the 1960's, it will also be
noted that the number of teenagers who do not graduate from
high school has not significantly decreased, despite the
fact that the proportion of the population graduating from
high school has increased from 48 percent in 1948 to 64
percent in 1962. In 1952, 24 percent of the males aged
20-24 had 8 or less years of education. By 1962, only 12
percent of the males between the ages of 20 and 24 were in
this educational class.[1] This is a significant improvement,
but the belief still persists that one of the greatest
economic tasks that remains for this country is to improve
upon the progress made thus far.

Purpose of This Research

The objective of this thesis is to examine the statis-
tical evidence supporting the often expressed sequence:
technological change, change in the structure of employment,
inadequate change in the educational attainment and training
of the labor force, increase in the structural disadvantage
of the poorly educated.

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[1]Appendix to Chapter IV, Table IV-C-2.

Professor R. A. Gordon has described this theme as follows:

> Here we can see the New Industrial Revolution at work. Technological change has been eliminating unskilled and semiskilled and even skilled jobs in manufacturing, mining, transportation, and the utilities. Yet in most of these sectors, demand has not been expanding rapidly enough to offset the job displacements that have resulted from the particular forms that increased productivity has taken. And the men displaced from unskilled and semiskilled types of manual work usually do not have the training--and often not even the minimum basic education--needed for the white-collar and technical jobs that are being created. This is a problem to which the Nation is increasingly addressing itself but to which there are no quick or easy solutions.[1]

The sequence of research presented in the thesis will follow the pattern of this theme. The first stage of research, presented in Chapter II, will be an attempt to relate changes in the productivity of labor by industrial sector with changes in employment in the industrial sectors during the period 1948 to 1962. It is hypothesized that those industrial sectors that enjoyed the most rapid increases in labor productivity were those sectors that tended to increase in employment at a slower rate than those industrial sectors with less rapid increases in labor productivity. There are many causes of productivity change, and technological change (sometimes called "automation") is but one of these causes. Since it is not within the scope

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[1] R. A. Gordon, "Twenty Years of Economic and Industrial Change," Space, Science and Life (Washington, D.C.: National Aeronautics and Space Administration, 1963), pp. 59-60.

of this study to separate the various causes of productivity

increases,[1] technological change will be considered a

sufficient cause of the changes in productivity to warrant

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[1]Edward F. Dennison attempted to do this in his very imaginative book, The Sources of Economic Growth in the United States and the Alternatives Before Us, Supplementary Paper No. 13 (New York: Committee for Economic Development, 1962).
    This study and much of the other research that has been published on the relationship between educational attainment and the ability to obtain employment presents but one facet of the importance of education. A related and very important function of education is the raising of levels of productivity. Edward Dennison (ibid.) has attempted to estimate the contribution to the rate of growth in GNP of education. Dennison has expanded his above-cited reference in "Measuring the Contribution of Education (and the Residual) to Economic Growth," in The Residual Factor and Economic Growth, OECP (Paris, 1964), pp. 13-55. The relationship between investment in education and economic growth has been extensively covered in Frederick Harbison and Charles A Myers, Education, Manpower, and Economic Growth (New York: McGraw-Hill Book Company, 1964). For other examples of this relationship, see Gary S. Becker, "Investment in Human Capital: A Theoretical Analysis," Journal of Political Economy (Supplement, October 1962) and W. Lee Hansen, "Total and Private Rates of Return to Investment in Schooling," Journal of Political Economy" (April, 1963). The relationship between educational attainment and individual income and productivity is also part of the broad picture of the relationship between educational attainment and employment. See, for example, Herman P. Miller, "Annual and Lifetime Income in Relation to Education, 1939-1954," American Economic Review, (December, 1960). For a fine summary of the overall relationship between educational attainment and employment, see Theodore A. Shultz, The Economic Value of Education (New York: Columbia University Press, 1963).

the use of productivity change as a measure of changes in technology and "automation." It is obvious that productivity change is only a very rough approximation of the impact of technology and "automation," but the two are often used interchangeably.[1]

Each industrial sector has an occupational structure. It will be demonstrated in Chapter III that those industrial sectors in which blue collar employment predominates have experienced the fastest increases in labor productivity. This links differences in productivity increase by industrial sector to the widely recognized trend from blue to white collar employment. An attempt will be made to quantify the impact that the differences in productivity changes between industrial sectors have had on the trend from blue to white collar employment. These trends in the industrial and occupational structures will be analyzed over time in the twentieth century to determine the relationship, if any, between the industrial and occupational structure. The rate of change in the structure will also be examined over time to determine whether shifts in the industrial and occupational structures have been faster in the postwar period than was the case earlier in the twentieth century.

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[1]For example, when John Snyder, op. cit., expresses fears about automation, what he is inferring is that automation causes labor productivity increases and thereby destroys jobs.

In Chapter IV, changes in the occupational structure will be related to educational attainment as a preparation for employment by occupation. This stage will attempt to quantify the often expressed idea that the more rapidly growing occupations have been the ones in which higher levels of educational attainment predominate.

The final step of the analysis will relate the findings of the study to the debate over the question: Has structural unemployment worsened during the postwar period? This thesis will deal with only one aspect of this question, the change in structural relationships that involve educational attainment. It will be contended that a consideration of both unemployment and participation rates by educational class should be the principal measure of structural difficulties.

Thus, this study will follow the path from technological change to the difficulties encountered by structurally disadvantaged members of the labor force during the postwar period. It should be noted that no direct causal relationship between technological change and change in structural difficulty may be inferred from the data presented in this thesis, because it is not possible to know what the experience of the postwar period would have been if adequate demand had been consistently maintained throughout the period.

Employment difficulties and the speed of technological change during the postwar period were two of the primary

factors which led President Kennedy to create a President's

Advisory Committee on Labor-Management Policy. The Com-

mittee's first formal report, "The Benefits and Problems

Incident to Automation and Other Technological Advances"[1]

related technological change and the labor force as follows:

> It is equally true that the current rate of
> technological advance has created social prob-
> lems and that an acceleration of this rate may
> intensify these problems.
> While advancing technology has given rise to
> new industries and jobs, it has also resulted in
> employee displacement; and the fact that new
> work opportunities are eventually created is no
> comfort or help to the displaced individual who
> cannot, for one reason or another, secure com-
> parable or any employment. While employment has
> expanded in some industries, the net effect of
> rising output per worker, of the growing labor
> force, and of other factors has been an increase
> in the volume of unemployment during the past
> few years -- even as total employment has reached
> new heights . . . .
> Our purpose, then, is to seek that course
> of action which will encourage essential progress
> in the form of automation and technological change,
> while meeting at the same time the social conse-
> quences such change creates.[2]

This acceptance by a government of the necessity of

technological change and of the concomitant responsibility

to alleviate the social hardships which often follow it

differs markedly from a long history of state policy which

ranged from restrictive action to "laissez-faire." For ex-

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[1]Report dated January 11, 1962 and reprinted in Nation's
Manpower Revolution, Hearings Before the Subcommittee on
Employment and Manpower of the Committee on Labor and Public
Welfare, U.S. Senate, 88th Congress, Second Session, Part 10,
July 6, 1964 (Washington, D.C.: Government Printing Office,
1964), pp. 3414-3422.

[2]Ibid., p. 3415.

ample, "It is reported that about 1579 the Council of Danzig had had strangled the inventor of a machine which would weave four to six pieces at once, lest his invention reduce many workers to beggary."[1]

The government of the United States in the 1960's has not chosen to employ such restrictive measures, nor has it chosen to adopt a pure "laissez-faire" attitude in the face of technological changes of great magnitude. There are two forms of remedial action which the government has taken to reduce the level of unemployment. First, aggregate demand has been increased through such measures as the Investment Credit Act of 1962 and the Internal Revenue Act of 1964. Second, programs under the Manpower Development and Training Act of 1962 and the Economic Opportunity Act of 1964 are designed to increase the skill of workers in order that they may become qualified to take advantage of employment opportunities.

It is hoped that the research findings presented in this thesis will foster a better understanding of the relationships between productivity, education and changes in the labor force that have made national programs for coping with the problems of the structurally disadvantaged a major objective of the 1960's.

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[1]Bernhard G. Stern, "Resistances to the Adaptation of Technological Innovation," in Technological Trends and Their Social Consequences, pp. 55-57, quoted in A. J. Jaffee and C. D. Stewart, Manpower Resources and Utilization (New York: John Wiley & Sons, 1951), p. 261.

CHAPTER II

THE IMPACT OF PRODUCTIVITY CHANGE ON THE

INDUSTRIAL STRUCTURE OF THE LABOR FORCE

This chapter on productivity will be divided into two parts. In the first part, a discussion of aggregate productivity, it will be observed that productivity during the postwar period has been growing faster than the long-run trends developed by the Bureau of Labor Statistics and John Kendrick. In the second part, a discussion of the varying rates of productivity increase in the major sectors of the economy, the relationship between productivity and the sectoral structure of employment will be explored.

Aggregate Productivity

Productivity, Labor Input, and Economic Growth

One aspect of the debate over the higher unemployment rate since 1957 has been the fear that output will not expand rapidly enough to maintain full employment if high rates of productivity increase experienced in the postwar period continue.[1] There is a clearly definable relationship between productivity, labor input and economic growth, and

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[1] See, for example, the "Platform Proposals of the AFL-CIO to the Republican and Democratic Conventions, 1964." The sections on unemployment, p. 1, or the 35-hour week, p. 3, and on automation, p. 4, are all relevant.

it may be useful to make this relationship explicit at this time. The faster the rate of productivity increase for a total economy, the faster must be the rate of economic growth, if the labor supply is to be unaffected by the increased level of productivity.

Productivity may be defined as:

(1) $$P = O/E$$

where O = output, GNP in 1954 dollars[1]
E = employment, in persons engaged.

The index of productivity change over time is defined by

(2) $$I = \frac{P_2}{P_1} = \frac{O_2/E_2}{O_1/E_1}$$

where 1 = starting time period
2 = ending time period.

Growth rates may be defined for each of the variables as follows:

(3) $$I = (1 + p)^n = P_2/P_1 \qquad \text{(productivity)}$$

(4) $$(1 + r)^n = O_2/O_1 \qquad \text{(output)}$$

(5) $$(1 + k)^n = E_2/E_1 \qquad \text{(employment)}$$

where p = productivity growth rate
r = output growth rate
k = employment growth rate
n = time period of change, in years

The relationship between the output in period 2 and productivity and employment change from period 1 to period 2 may now be seen.

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[1] Other measures of output could have been used such as the Federal Reserve Index of Production. Labor input could have been in manhours rather than manyears. Weighting by sector would be useful for some purposes and should be considered. The model described here is the one used in this thesis in the section on productivity changes by industrial sector.

$$(6) \qquad I = (1 + p)^n = \frac{O_2/E_2}{O_1/E_1} = \left(\frac{O_2}{O_1}\right)\left(\frac{E_1}{E_2}\right)$$

$$(7) \qquad O_2 = O_1(1 + p)^n \frac{E_2}{E_1} = O_1(1 + p)^n(1 + k)^n$$

Given estimates of employment and productivity change, it then becomes possible to calculate the rate of change in output required to absorb the expected rate of increase in employment input.

$$(8) \qquad (1 + p)^n = \left(\frac{O_2}{O_1}\right)\left(\frac{E_1}{E_2}\right) = \frac{(1 + r)^n}{(1 + k)^n}$$

which reduces to

$$(9) \qquad (1 + p)(1 + k) = 1 + r$$

$$(10) \qquad r = (1 + p)(1 + k) - 1$$

Since equation (10) converts to

$$(11) \qquad k = \frac{r - p}{1 + p}, \quad \text{or} \quad k = \frac{1 + n}{1 + p} - 1$$

it is possible to observe that for a given level of expected increase in employment input (k), the larger the magnitude of productivity increase (p), the greater must be the rate of growth in output (r). To the extent that increases in productivity have an effect on the increase in

labor input,[1] then the relationship between the rate of
increase in productivity and the rate of increase in
economic growth should have the impact of productivity change
on the supply of labor factored in. The level of produc-
tivity could double and output could remain constant, if the
level of labor input is halved.[2] Higher productivity, for
example, may help to create the wealth that makes possible
increased education. To the extent that the labor force
is reduced by potential workers spending more time in
school, then higher productivity has resulted in a smaller
labor force. If workers with low skills are forced out of
the labor force because of the changed occupational structure
of the labor force that is partially a result of changes in
productivity, then here is another way in which increased
productivity results in less labor input. It should be

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[1]Clarence Long has listed many of the reasons why
people work in: The Labor Force Under Changing Income and
Employment, National Bureau of Economic Research (Princeton,
N.J.: Princeton University Press, 1958), p. 3. This book
provides a fine analysis of the relationships between in-
come levels, educational attainment, and labor force par-
ticipation. The effect that a combination of inadequate de-
mand for labor plus changes in the structure of employment
can have on labor force participation rates is analyzed in
Chapter IV of this thesis.

[2]From equation (6), $I = \frac{O_2}{E_2} \cdot \frac{E_1}{O_1}$. Substituting these as-

sumptions gives $2 = \frac{O_2}{.5E_1} \cdot \frac{E_1}{O_1}$ and $2 O_1 = 2 O_2$ or $O_1 = O_2$.

observed that, in both of these examples, the effect of reduction in the labor force is to foster increased levels of productivity. Workers with more education tend to be more productive, and low-skilled workers forced out of the labor force tend to be below-average in productivity.[1]

Productivity Increase in Historical Perspective

Given the relationship between productivity, labor input and economic growth, an examination of the statistics on productivity change may shed some light on changes in the labor force during the postwar period. The aim of this section on aggregate productivity is to compare rates of productivity increase in the postwar period with the long-run rates in the twentieth century. The long-run series of output per manhour prepared by John W. Kendrick[2] and the Bureau of Labor Statistics[3] are suitable for this comparison. Since the task of measuring productivity for the

---

[1]If workers are paid their marginal product, then the differences in median income related to educational attainment that are presented in Chapter IV of this thesis would indicate that, if workers with low educational attainment are forced out of the labor force, the average level of productivity (median income) should rise.

[2]John W. Kendrick, Productivity Trends in the United States, National Bureau of Economic Research (Princeton, N.J.: Princeton University Press, 1961).

[3]Bureau of Labor Statistics, "Trends in Output per Man-Hour in the Private Economy, 1909-1958," (Washington, D.C.: Government Printing Office, 1959).

government sector is almost impossible because of the dif-

ficulty in defining "output," the aggregate measure used

here will be output per manhour in the private economy.

One should treat productivity statistics with great caution.

To the extent that the system of deflating to the real

product is inaccurate, distortions occur.[1]

Table II-A provides rates of growth in output per

manhour in the private economy for various subperiods. It

will be observed that the rate of growth in output per man-

hour derived from the index compiled by the Bureau of Labor

Statistics was 1.9 percent between 1909 and 1948 and 3.2

percent between 1948 and 1962 or almost 70% faster during the

postwar period. Since the period 1929-1948 is distorted by

the depression and World War II, a comparison between the

postwar period and 1909-1929 may be more useful.

---

[1]A fuller discussion of limitations in the productivity
statistics follows in the next section on productivity in
the industrial sectors. Although the aggregate productivity
figures presented in this section are for the private economy
and therefore exclude the governmental sector where output
is difficult to measure, it should be observed that there are
sectors within the private economy (such as the service
sector) where this limitation also applies.

Table II-A

Output per Manhour in the Private Economy
for Selected Periods, 1909-62

Average Annual Percentage Increase

	Kendrick	Bureau of Labor Statistics
1890-1909	1.9	N.A.
1909-1929	2.1	1.6
1919-1929	2.4	2.3
1929-1948	2.4	2.2
1948-1957	3.4	3.2
1948-1962	N.A.	3.2
1909-1948	2.3	1.9
1909-1957	2.5	2.2
1909-1962	N.A.	2.3
1957-1962	N.A.	3.1

Source: John W. Kendrick, Productivity Trends in the United States, National Bureau of Economic Research (Princeton, N.J.: Princeton University Press, 1961), Table A-XXII, pp. 333-335; The Economic Report of the President, 1964, op. cit., p. 245 for 1948-1962; linked to "Trends in Output per Man-Hour in the Private Economy, 1909-1958," Bureau of Labor Statistics, (Washington, D.C.: Government Printing Office, 1959), p. 17-18 for the years 1909-1947. Compound growth between terminal years was used. Chart II-A presents a comparison using least square trend lines fitted to the logarithms of the data.

Chart II-A

Trends Fitted to Index of Output per Man-Hour: 1909-29 and 1948-63

(Private Economy - Ratio Scale)
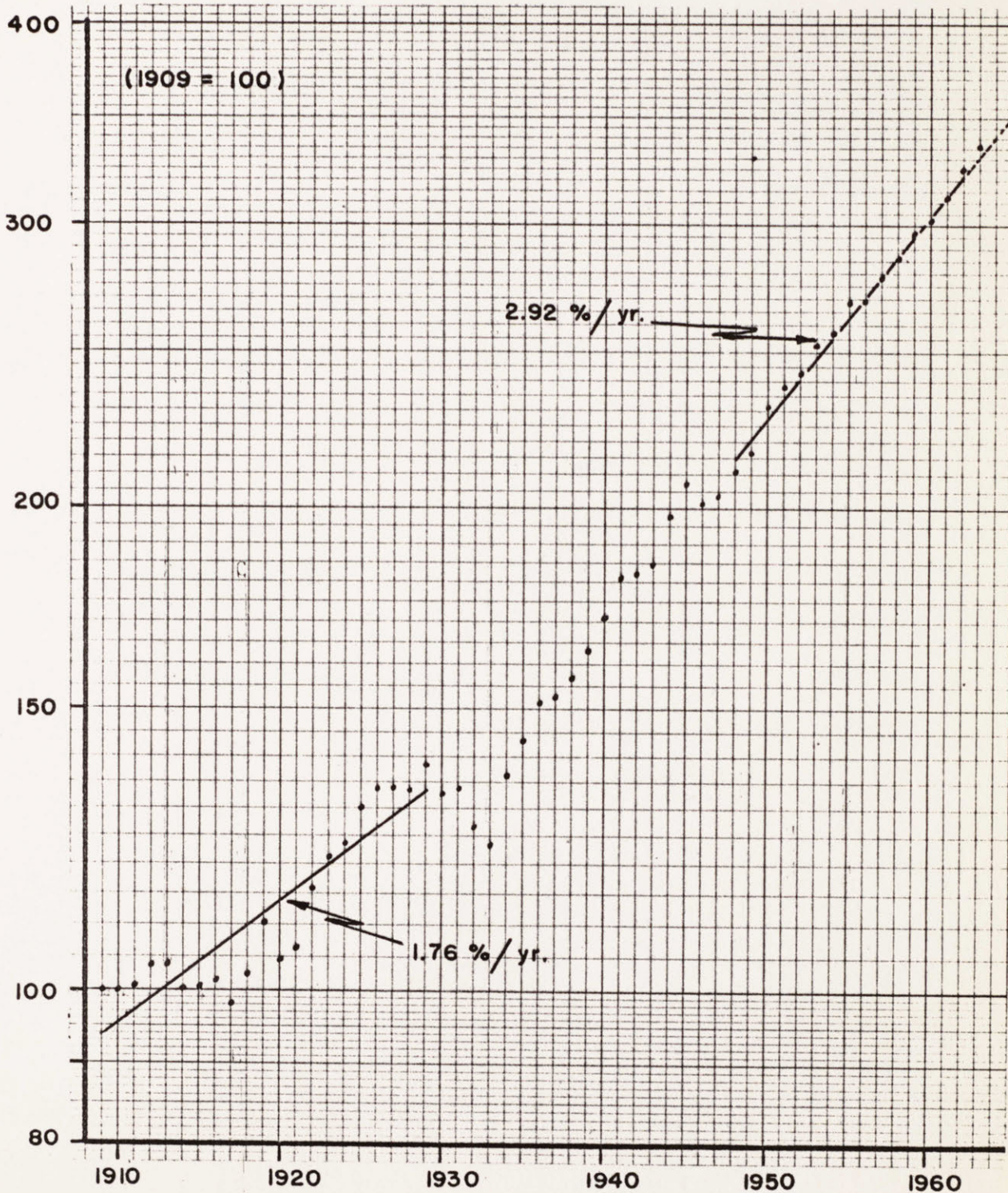
Source: Appendix A-1.

Chart II-A presents the comparison between the earliest normal period that the B.L.S. series provides, 1909-1929, and the postwar period, 1948-1963. As Kendrick's series follows the B.L.S. series very closely, it is possible to link the B.L.S. series with Kendrick's data for 1900 to 1909 and to conclude that the postwar period experienced a rate of productivity increase approximately 70% faster than the rate of productivity increase between 1900 and 1929. The choice of periods for comparison should be explained, as the rate of change that is calculated can be greatly influenced by the terminal points of the periods that are selected.[1] The year 1948 was selected as a base for the postwar calculation because it was assumed that much of the disruption resulting from World War II was over by then. An examination of the plots in Chart II-A indicates that the selection of a year later than 1948 would make little difference because of the very close fit to the trend line that the postwar period has shown. The selection of the period 1909-1929 is somewhat more questionable.

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[1]The choice of method of calculation will also affect the rate of growth. Chart II-A was computed by fitting a least squares trend line to the logarithms of the data. Table II-A was computed by calculating the compound rate of growth between the terminal points. The difference in rates of growth between Chart II-A and Table II-A for the periods 1909-29 and 1948-62 is a result of this different method of calculation. The use of a compound rate of growth between two terminal points tends to make the choice of terminal points of greater significance than when a least squares trend line is fitted to the data.

If a base year close to 1920 is taken with 1929 as the end-ing period, there results a period before the postwar period in which productivity increases were approximately as fast as in the postwar period. There is, however, no period be-tween 1909 and 1929 as long as the postwar stretch of rapid productivity increases nor is there a period of progress comparable to the postwar period in length and rate of in-crease between 1899 and 1929.

Since productivity increases are measured by annual compound rates of growth, the longer the period, the larger is the magnitude of change. The base is another critical variable when the magnitude of progress is being considered. A 3 percent rate of increase in productivity in the base year of 1909 in Chart II-A would give an increase in the index of 3 points (where 1909 = 100). A 3 percent rate of increase for 1963 when the index of productivity was almost 340,[1] would give an increase in the index of almost 10 points - or 10 percent of the level of productivity in 1909. Because Chart II-A is on a logarithmic scale, to give it the same rate in the postwar period as in the earlier period requires a much faster increase in progress measured in absolute terms.

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[1]See appendix A-1.

Productivity Increase and the Problem of Unemployment

The relationship between rapid productivity increases and high levels of unemployment may be examined in several ways. First, rapid productivity increases require correspondingly rapid increases in demand if a given level of labor input is to be maintained.[1] Thus, because demand is not considered, the mere fact of the relatively faster productivity increases of the postwar period provides little information about the relatively higher unemployment rate since 1957. High rates of productivity increase are not necessarily associated with high unemployment rates.[2] Second, productivity change affects the industrial structure. All sectors do not experience productivity change at the same rate. Often, the change in output of the industrial sectors does not compensate for, or correspond to, the different changes in productivity. As the industrial structure is altered, certain industries and occupations

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[1]It is necessary to specify labor input and not merely employment because changes in average hours worked affect the changes in the number of people employed.

[2]For example, output per manhour increased by over 4 percent a year between 1938 and 1945 (data from Kendrick, op. cit., p. 333) and yet the rate of unemployment fell from 19.1 to 1.9 percent (Lebergott, op. cit., p. 512). This decrease in unemployment rates during a period of rapidly increasing productivity can be explained by an increase of output of 7 percent a year, while civilian employment increased 1.2 percent a year and large numbers of men were in the armed forces.

may have an unemployment problem even during general

prosperity.[1]   Third, rapid increases in productivity may

have an income effect which alters the industrial and occu-

pational structure. As increases in per capita wealth

accompany rapid increases in productivity, proportions of

total income spent for various purposes may shift.[2] It is

important to note that changes in the industrial and occu-

pational structures do not by themselves account for the

level of unemployment. The critical variable of adequate de-

mand must be considered. Shifts in the labor force are a

function of changes in demand as well as of different rates

of productivity change by sector.

The effect of productivity change on the industrial

structure will be analyzed in the next section of this chapter.

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[1]The A.F.L.-C.I.O. has established an Executive Council
on Automation Commission. It has called for a national
Commission on automation to assess and ameliorate the social
costs of technological progress. See statement in Nation's
Manpower Revolution, Part 10, op. cit., pp. 3423-24.

[2]Early research on this income effect was published by
Ernst Engel in 1895 in Bulletin de l'Institut international
de statistique. Gardner Ackley discusses "Engel's Law" in
Macroeconomic Theory, (New York: The Macmillan Company,
1961), p. 221.

Productivity Increases by Industrial Sector

One working hypothesis of this paper is that the demand for relatively unskilled labor has been adversely affected by faster rates of increase in productivity in those sectors of the economy which traditionally have used this class of worker extensively (e.g. farming, mining, and manufacturing -- the "goods" producing sectors). In order to test this hypothesis, productivity per person engaged was computed for all the major sectors of GNP, and the change in employment by sector was correlated with the increase in productivity by sector.

The relationship between productivity increases and changes in employment depends upon many variables. Productivity increases may result in a relative price advantage for the sectors with the more rapid increases in productivity. The relative price advantage may result in such a relatively greater output increase that the sector with the greater productivity increase will either gain in its share of total employment or at least not lose in its share of employment. There is the income effect to be considered, as well. Productivity increases tend to increase per capita wealth. With a higher median level of income, the consumption pattern of a nation may change. Other variables may enter the picture. If the intensity of competition declines, then productivity advances may not be passed on to the consumers,

but may be kept to be shared by employers and employees of the sectors with faster productivity increases. Some of these relationships will be analyzed later in this chapter. It is necessary to warn that the relationship between productivity increases and employment change that is analyzed first can only be considered a partial relationship in a much larger picture.

To calculate productivity, real GNP[1] by sector is the measure of output utilized here; persons engaged in production is the measure of labor input. Since the labor input measure attempts to account for full time equivalent man-years of input, it appears to be the most suitable series for the purpose of studying the effect of productivity on employment. The more commonly used output per manhour measure would tend not to give as accurate a picture, as it would be distorted by overtime and part-time differences among the sectors. Table II-B gives the rate of productivity increase by industrial sector and the rate of change in persons engaged by industrial sector. Chart II-B illustrates the correlation between changes in productivity and changes in employment by sector for the period 1948 to 1962. The numbers used in Table II-B are also used to label the points in Chart II-B.

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[1]See appendix A-2 for a more complete description of sources.

Table II-B

Productivity and Employment Increase
by Industrial Sector, 1948-62

		Average Annual Percentage Increase in	
		Productivity	Persons Engaged
(1)	Agriculture	5.1	-2.6
(2)	Mining	4.7	-2.9
(3)	Contract Construction	0.5	1.9
(4)	Manufacturing	2.7	0.5
(5)	Wholesale and Retail Trade	1.5	1.5
(6)	Finance, Insurance and Real Estate	1.0	3.6
(7)	Transportation	3.3	-1.1
(8)	Public Utilities and Communication	6.7	0.9
(9)	Services	1.3	2.3
(10)	Government	-0.1	3.6

Productivity = output/person engaged

Source: See Appendices A-3 and A-4. Numbers also refer to points in Charts II-B, -C, -D.

The relationship between increases in productivity and employment changes in the industrial sectors was clearly a negative one. The greater the increase in productivity, the lower tended[1] to be the increase in employment. Due to the small number of observations, the different weights of employment in the sector, and the manner in which output is defined in the government sector (10), several calculations

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[1]It is necessary to use the past tense here because the findings presented in this chapter are descriptions of what has happened during the postwar period 1948-1962. Extrapolations of these trends do not automatically follow. This warning will be expanded in subsequent chapters.

Chart II-B

Employment Change vs. Productivity Change by Industry: 1948-62

(Average Annual Percents)

$$\Delta E = 2.75 - 0.75 \, \Delta P$$
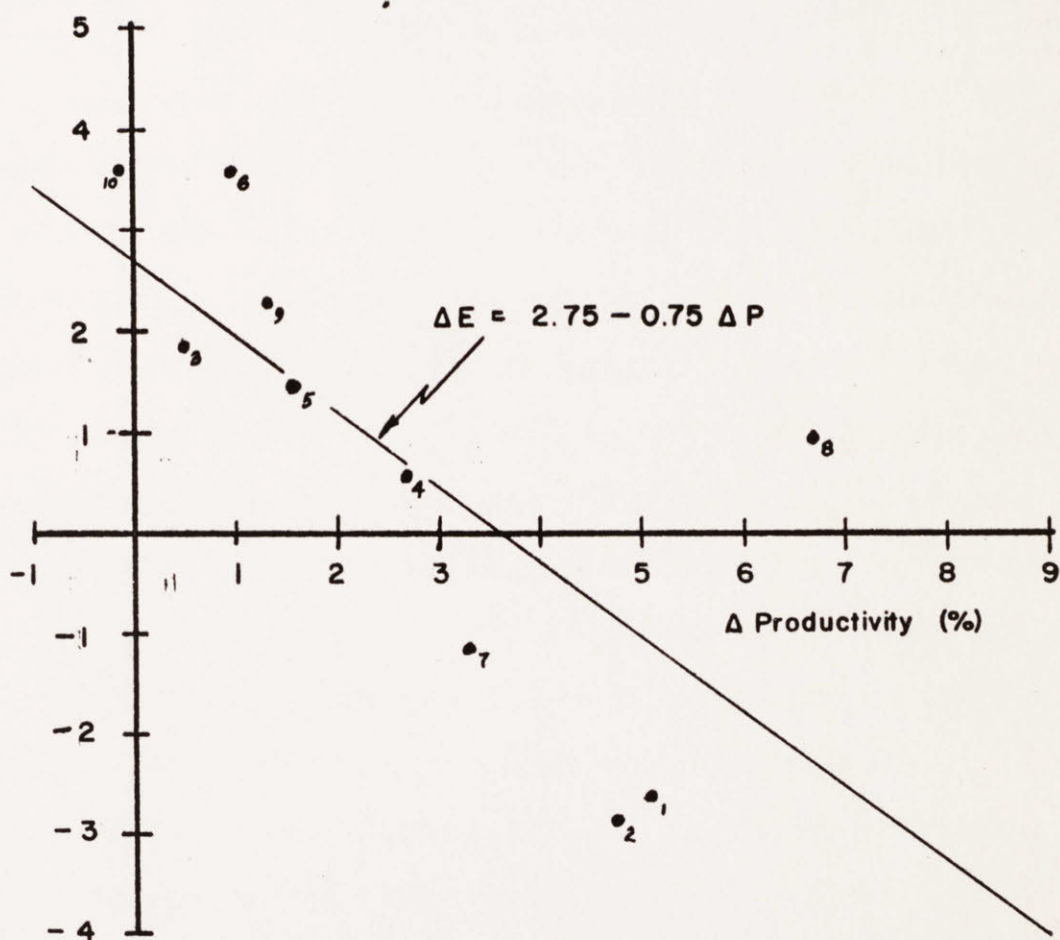
Source: Appendices A-3 and A-4.

of correlation were made. The coefficient of correlation was (a) -0.731 for all points unweighted (significant at the 5.0 percent level); (b) -0.868 for all points weighted by employment in the beginning and ending periods (significant at the 1.0 percent level); and (c) -0.814 for all points except government (10) weighted by employment of the beginning and ending periods (significant at the 1.0 percent level). All correlations were significantly negative.

The regression line for the calculation of all points unweighted is presented in Chart II-B. The one point substantially off the trend line is point 8, public utilities and communications. This sector ranked sixth[1] in employment increases, but ranked first in increases in output.[2] The difference between the two rankings is explained by the very high rate of productivity increase. Relative price advantage, technology changes, and consumer tastes all contributed to the extraordinary increase in output which resulted in an increase in employment despite the high productivity increases. The correlation calculations presented were parametric tests of relationships, and the different levels of quality in the sector price deflators may distort the

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[1]Table II-B.

[2]Appendix A-5.

cardinal relationships between the sectors even though the ordinal relationships may be unaffected. For example, the government sector (10) may have experienced a faster rate of real productivity increase than is shown in chart II-B, but the nature of price deflators of government output may have hidden the real productivity increase. If it is accepted that this is true, but that the government sector would still rank lowest in productivity increases, then a rank correlation may be a better measure of association in a situation such as this that is distorted by price deflators. A rank correlation of all points was -0.83, significant at the .01 level.

Victor R. Fuchs[1] has been engaged in a study of relative rates of productivity increase in the goods and service sectors. His period of analysis is a longer run, 1929-61, and his methodology and his findings on the relationship between productivity increases and employment changes in the ten industrial sectors were similar to the ones presented in this chapter. Professor Fuchs discovered a negative relationship between increases in productivity

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[1]Victor R. Fuchs, "Productivity Trends in the Goods and Service Sectors, 1929-61: A Preliminary Survey," Occasional Paper 89 (New York: National Bureau of Economic Research, 1964).

and changes in the employment of the industrial sectors.
His correlation was -0.84, significant at the .01 level for
increases in output per man and changes in employment.
Professor Fuchs also calculated increases in output per man-
hour and changes in employment and here he obtained a cor-
relation of -0.86, significant at the .01 level.[1]

Consistency Between Time Periods of the Postwar Period

Research in the functioning of the postwar economy often
divides the economy with two periods, using the year 1957
as the point of division.[2] The period ending in 1957 was
one of relatively full employment compared with the period
subsequent to 1957. One of the interesting findings of
this research is that the relationship between productivity
increases and changes in employment in the industrial sec-
tors was very similar in the periods 1948-57 and 1957-62.
Charts II-C and II-D present the relationships for the time
periods. The correlation of the regression line on Chart
II-C for the period 1948-57 was -0.60, significant at the
.05 level. The correlation of the line on Chart II-D for
the period 1957-62 was -0.70, significant at the .01 level.

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[1] Ibid., p. 17.

[2] See, for example, Higher Unemployment Rates, 1957-
1960..., op. cit.

Chart II-C

Employment Change vs. Productivity Change by Industry: 1948-57

(Average Annual Percents)

Δ Employment (%)

$$\Delta E = 2.97 - 0.70 \Delta P$$
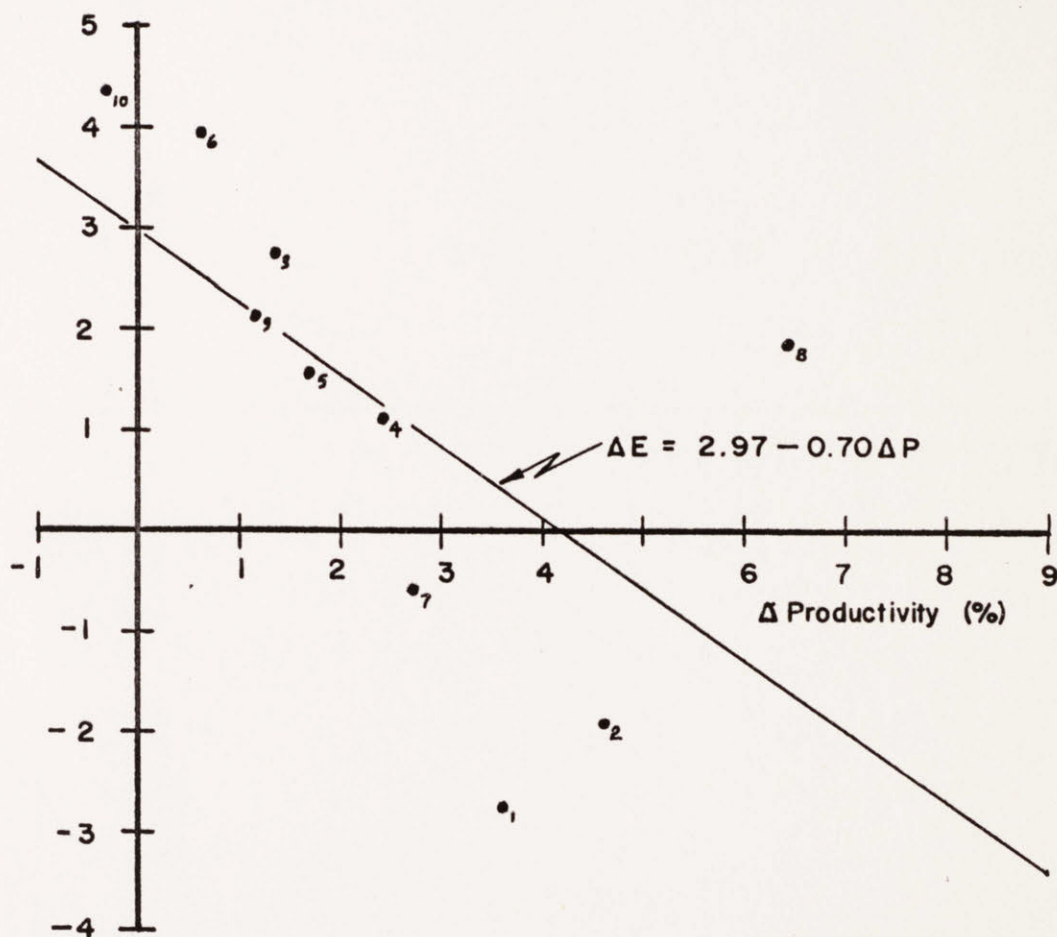
Δ Productivity (%)

Source: Appendices A-3 and A-4.

Chart II-D

Employment Change vs. Productivity Change by Industry: 1957-62

(Average Annual Percents)

Δ Employment (%)

ΔE = 1.72 − 0.60 ΔP

Δ Productivity (%)
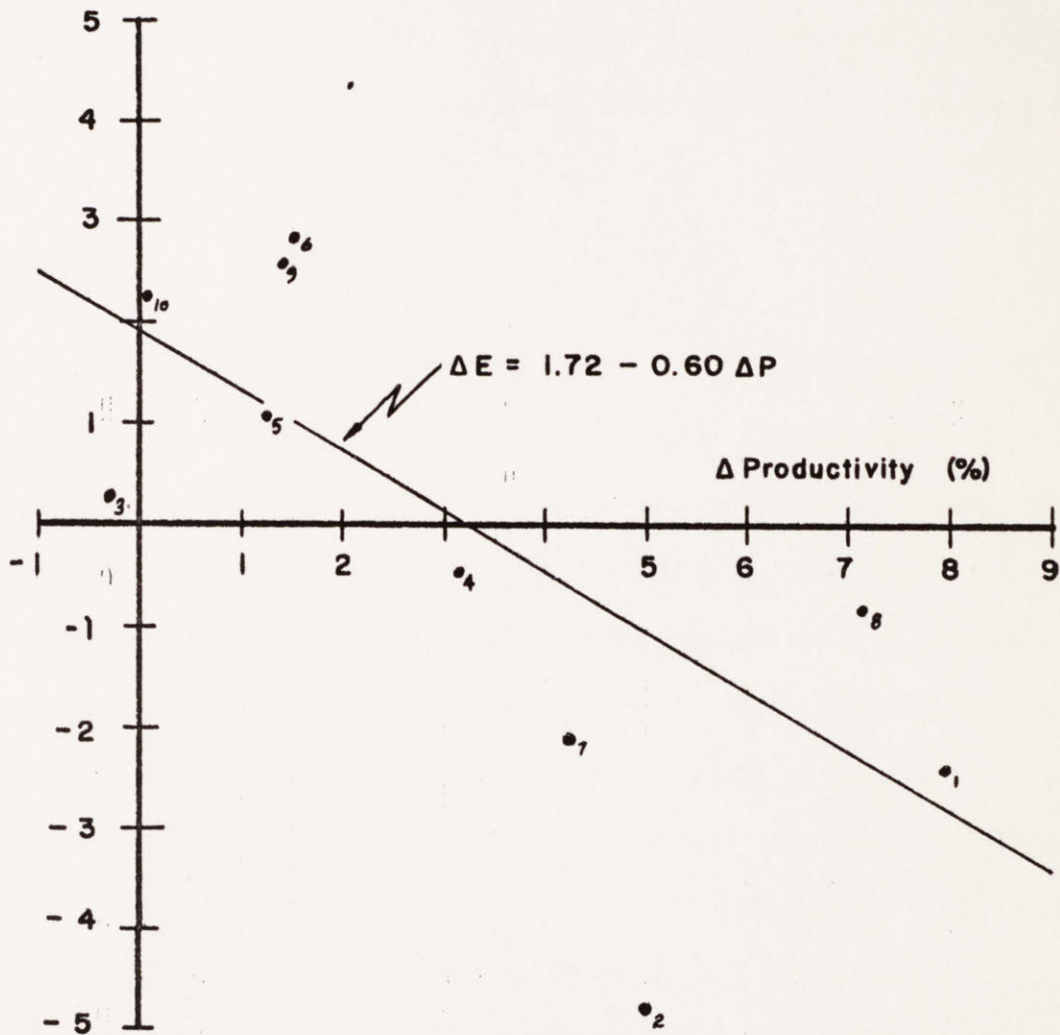
Source: Appendices A-3 and A-4.

The difference in results between the two periods can largely be explained by change in the behavior of the public utilities and communications sector (8) that came closer to the line in the period 1957-62. These correlations were for all points unweighted. The rank correlation gave essentially similar results: -0.79 for the period 1948-57, significant at the .01 level; -0.65 for the period 1957-62, significant at the .05 level.

Price Deflators: A Cautionary Note

One might be better satisfied with these findings if it was not for the manner in which output is deflated for the various sectors. In the goods sectors (agriculture, mining, manufacturing) and in public utilities, which is called a "service" but has a measurable product, the output is something which can be measured. The other sectors are much more difficult to handle. In particular, the price deflating system for the government sector is based on the assumption that there is no productivity increase. "To convert the current dollar government gross product into constant dollars, real output is assumed proportional to the employment input, thus excluding the effect of possible changes in output per employee" is the precise procedure given by Martin L. Marimont,[1] chief, National Economics

[1] "GNP by Major Sectors," Survey of Current Business, (October 1962), p. 6. It is difficult to understand why output is measured by inputs in the government sector. The continued use of the present methods of deflation for the total government sector perhaps represents a continuation of a custom that was established before there was so much public concern over inflation.

Division of the Office of Business Economics, Department of
Commerce.

If it is believed impossible to calculate productivity
for the government sector, what about the other sectors? The
service sector, contract construction, trade and the fixed
investment component of the manufacturing sector are all
very suspect, given the nature of their outputs. Table II-C
gives the change in deflators by sector between 1947 and
1960. It is obvious that the difference between the goods
sectors and the others is very substantial. For example, the
current output of the government sector was reduced by over
twice the rate of all sectors in the process of deflation.
The ideal good for deflation is one that has a standard
physical characteristic that has not varied over time, such
as a watt of electricity. Such ideal goods have represented
a smaller proportion of GNP over time as the proportion of
the economy in non-goods has increased.

Table II-C

Percent Change in Industry Deflators, 1947-1960

ALL Industries, total (GNP)		37.8
(1)	Agriculture, Forestry, and Fisheries	-18.7
(2)	Mining	37.5
(3)	Contract Construction	71.5
(4)	Manufacturing	40.2
	Producers' Durable Equipment	58.3
(5)	Wholesale and Retail Trade	31.9
(6)	Finance, Insurance and Real Estate	55.7
(7)	Transportation	31.2
(8)	Communication	33.7
	Public Utilities	- 1.1
(9)	Services	61.8
(10)	Government	80.2

Source: Ibid., Table 2, p. 10 for all sectors. The sub-sector, Producers' durable equipment, was calculated from data in the Economic Report of the President, 1964, (Washington, D.C.: Government Printing Office, 1964), Table C-6, p. 214.

Producers' durable equipment was inserted here because it is a major subsection of manufacturing, and yet the manner in which it has been calculated appears to be very similar to that used for the government sector. Edward Denison has defended the procedure of deflating by input as necessary, given the inability to deflate by output. He differentiated the way producers' goods are deflated in contrast to consumers' goods. "Quality improvements in product not involving additional costs are usually considered as increases in output for industries producing consumers' goods but, by method 1 [his deflation by input which is close to the definitions of the Department of Commerce procedures], are not so considered

in the case of durable capital goods."[1]   In a footnote at this point, he further observed: "However, in actual practice, failure to catch quality changes of this type is about as general in deflating consumers' goods as producers' goods, so that the actual estimates are comparable."[2]

Defining real output is, at best, a difficult task. For example, if a dentist with a high speed drill works faster, this is indeed an increase in productivity. If he charges more for the filling, is this an increase in price which should be deflated? Or is the reduction in pain achieved through the utilization of more expensive equipment a "good" which is paid for by the higher cost per filling?

Productivity increases in sectors such as government tend to be underestimated in the process of deflation. This tendency places a limitation on the significance of the correlations seen in Chart II-B. However, it is probable that the failure to note quality changes in consumers' goods produces a similar distortion in the "better" deflated sectors.

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[1] Edward Denison, "Theoretical Aspects of Quality Change, Capital Consumption, and Net Capital Formation," Problems of Capital Formation, National Bureau of Economic Research, Studies in Income and Wealth, Volume 19 (Princeton, N.J.: Princeton University Press, 1957), pp. 226-227. Italics mine.

[2] Ibid., p. 227.

If, in reality, both the "poorer" and the "better" deflated
sectors have experienced more rapid productivity increases
than the statistics indicate, then perhaps the limitation
that the process of deflation places on the correlations in
Chart II-B is somewhat less serious.

The limitation of price deflators is a very real prob-
lem for which no satisfactory solution has yet been found.
Much of economic analysis is done in real terms and is sub-
ject to the limitations discussed here. If one were able
to have a more accurate picture of increases in real output,
a large body of economic literature would have to be revised.
Capital-output ratio analysis,[1] which would be particularly
affected, rates of economic growth, and international com-
parisons of per capita well-being are but a few of the
areas which rely upon inadequately deflated output. For
example, in the comparison of rates of growth of different
countries, the deflation process may play a considerable
role, especially when the fact that government employment
in the United States has increased from 6.9 percent of total
employment in 1929 to 16.1 percent in 1962[2] is taken into

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[1] See P. S. Anderson, "The Apparent Decline in Capital-
Output Ratios," Quarterly Journal of Economics (November
1961), pp. 613-634, for a discussion of this problem.

[2] Appendix C-3, Calculated from Department of Commerce
data.

account.

That productivity measures so important to labor re-
lations and public policy are saddled with the limitations
of price deflators is indeed unfortunate. The recent
literature has evinced the great uncertainty which this prob-
lem has caused. For example, on March 15 Leon Greenberg,[1]
assistant commissioner for productivity and technological
developments of the Bureau of Labor Statistics, announced
that productivity in manufacturing may not have been as
rapid as reported. George Meany, president of the A.F.L.-
C.I.O., responded with a letter to Secretary of Labor Wirtz.
After observing that the Federal Reserve Board[2] indexes of
output have risen faster than the comparable output measures
in GNP, Meany said: "This subject of rising productivity
is altogether too important to the nation -- and particularly
to American workers -- to permit statistical differences
among Government technicians to hide the reality."[3] If all

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[1]The New York Times (March 16, 1964), p. 1.

[2]See the article by Clayton Gehman, "Measuring and
Analyzing Economic Growth," pp. 1046-1060, Federal Reserve
Bulletin, Vol. 49, No. 8 (August 1963), which attempts to
demonstrate that the slowdown in economic growth as measured
by GNP is not an accurate picture of the actual economic
performance.

[3]The New York Times (March 20, 1964), p. 15.

this is unfair to American Labor, it is also unfortunate for economic researchers.[1] It is therefore necessary to be cautious when working with deflated output and to attempt to justify findings by various checks (such as dropping the government sector (10) or using the rank method of correlation).

Another method of checking on the deflation effect is to examine proportion changes in employment and output in both real and current dollars. Table II-D gives the proportions of employment in 1948 and 1962, and Table II-E gives the distribution of GNP by major sectors in both current and 1954 dollars for the years 1947 and 1962. It will be seen that the process of deflation makes a substantial difference in the proportion of GNP that each sector maintained. However, this difference does not obscure the essential fact that the goods producing sectors have experienced faster increases in productivity than the other sectors. This may be seen by comparing the change in employment by sector in Table II-D with the change in GNP by sector in Table II-E.

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[1]After one has considered the sources of data available, it is difficult to be harsh with the economists and statisticians who prepare the series on outputs and productivity. See Leon Greenberg, "Data Available for the Measurement of Output per Man-Hour," Output, Input, and Productivity Measurement, National Bureau of Economic Research, Studies on Income and Wealth, Volume 25 (Princeton, N.J.: Princeton University Press, 1961), pp. 147-199.

Table II-D

Industrial Proportion of Total Employment, 1948 and 1962

	Sector	Percent of Total 1948	Percent of Total 1962
(1)	Agriculture	12.0	7.0
(2)	Mining	1.7	1.0
(3)	Contract Construction	5.6	6.1
(4)	Manufacturing	26.4	24.2
(5)	Wholesale and Retail Trade	19.3	20.1
(6)	Finance, Insurance and Real Estate	3.3	4.6
(7)	Transportation	5.1	3.7
(8)	Public Utilities and Communications	2.2	2.1
(9)	Services	12.8	14.9
(10)	Government	11.6	16.1

Note: Columns may not add to 100.0 due to rounding.

Source: Calculated from appendix C-3, Department of Commerce Data.

Table II-E

Distribution of GNP by Major Sectors: 1947 and 1962

	Sector	Current Dollars 1947	Current Dollars 1962	1954 Dollars 1947	1954 Dollars 1962
(1)	Agriculture, Forestry and Fisheries	9.1	4.2	6.3	4.8
(2)	Mining	2.7	2.1	3.0	2.4
(3)	Contract Construction	3.8	4.6	4.3	3.9
(4)	Manufacturing	28.4	27.7	29.4	28.2
(5)	Wholesale and Retail Trade	19.8	17.6	19.0	17.3
(6)	Finance, Insurance and Real Estate	9.4	12.2	10.9	12.6
(7)	Transportation	5.9	4.2	6.1	4.8
(8)	Communication and Public Utilities	3.1	4.7	3.0	5.6
(9)	Services	9.1	11.1	10.1	10.1
(10)	Government	8.2	10.9	9.2	9.0

Note: May not add up to 100.0 due to rounding.

Source: The National Industrial Conference Board, The Economic Almanac, 1964, p. 127. The problem of deflation has been analyzed previously. The real change in proportions is somewhere between the current and real columns.

The percentage proportion of total employment held by the goods sectors fell from 50.9 to 42.0, or by 18 percent between 1947 and 1962. The percentile of GNP in current dollars held by the goods sectors fell from 49.9 to 42.8, or by 14 percent between 1947 and 1962. The percentage of GNP in real (1954) dollars held by the goods sectors fell from 49.1 to 44.1 during the same period, a decline of 10 percent. Therefore, there has been during the postwar period a decline in the proportion of employment held by the goods producing sectors greater than the decline in the proportion of GNP held by these sectors, whether GNP is in current or constant dollars.

The Relationship between Changes in Productivity, Output and Price Deflators

The finding that those sectors with the fastest rates of productivity increase have been those sectors that have tended to lose their share of both output and employment conflicts with a hypothesis that postulates that those industries with above average productivity increases have lower prices relative to other industries and thereby attain above average increases in output.[1] That is to say, higher productivity increase should be associated positively with increases in output and negatively with increases in price deflators. This is precisely the result obtained by corre-

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[1] See, for example, John Kendrick, op. cit., p. 189, for a statement of this hypothesis.

lations calculated from the data developed for 24 industries
from 1923 to 1950 by W. E. G. Salter.[1] Those industries
with the fastest increase in productivity tended to increase
in output the most (r = + .70, significant at 1%); those
industries with the fastest increases in productivity tended
to be those industries that had the smallest increases (or
decreases) in prices as measured by the Wholesale Price
Index. Here the negative correlation gave an r of -.78, sig-
nificant at the 1 percent level.

The productivity increase -- relative price decrease --
above average output increase theory would require those
sectors of the economy which have had relatively greater
increases in productivity to increase their share of national
income in order to hold their share of employment. Tables
II-D and II-E demonstrate that this, in fact, has not hap-
pened. Chart II-E does indicate that those sectors with
the more rapid productivity increases did tend to have smaller
increases in prices (r = -.89,[2] significant at the 1 percent
level). But Chart II-F demonstrates that those sectors with

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[1] W. E. G. Salter, _Productivity and Technical Change_
(Cambridge: University Press, 1960), p. 164. In order to
minimize the effect of an extreme observation, the industry
with the fastest growth, rayon and allied products, was al-
lowed to equal the performance for the second fastest in-
dustry, electricity.

[2] The government sector (10) is not included in these
calculations.

the most rapid increases in productivity tended to increase
in output the least (r = -.78,[1] significant at the 1 percent
level). And Chart II-G makes manifest the interesting fact
that those sectors of the economy with the largest increases
in real output appeared to be the sectors that experienced
the greatest increases in prices (r = +.73,[2] significant at
the 1 percent level).

The effect that the accuracy of price deflators has
on productivity increases has been analyzed previously in
this chapter. If deflators are more incorrect for the non-
goods producing sectors than for the goods producing sectors,
and if the error is toward understating real output by over-
stating price increases, then a number of reservations about
the findings pictured in Charts II-E, -F, and -G are in
order. Since productivity change is measured by the ratio
real output/employment at different points in time, those
sectors with more accurate deflators will have a smaller
percentage of their real output taken away in incorrect
deflation. Productivity increase in these sectors would
consequently be relatively greater than in the sectors with
poorer deflators. This interrelation between productivity
and deflation would contribute to the definite tendency seen

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[1]The government sector (10) is not included in these
calculations.

[2]The government sector (10) is not included in these
calculations.

Chart II-E

Price Deflator Change vs. Productivity Change
by Industry: 1948-62
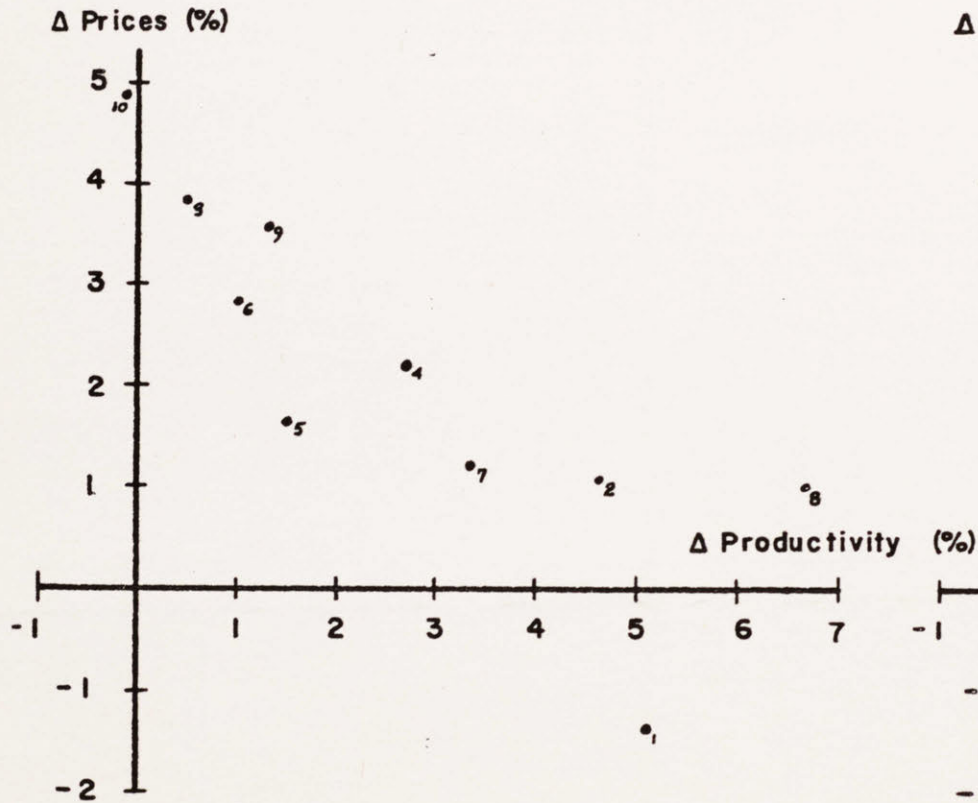
(Average Annual Percents)

Chart II-F

Output Change vs. Productivity Change
by Industry: 1948-62

(Average Annual Percents)

Source: Appendices A-3 and A-7.
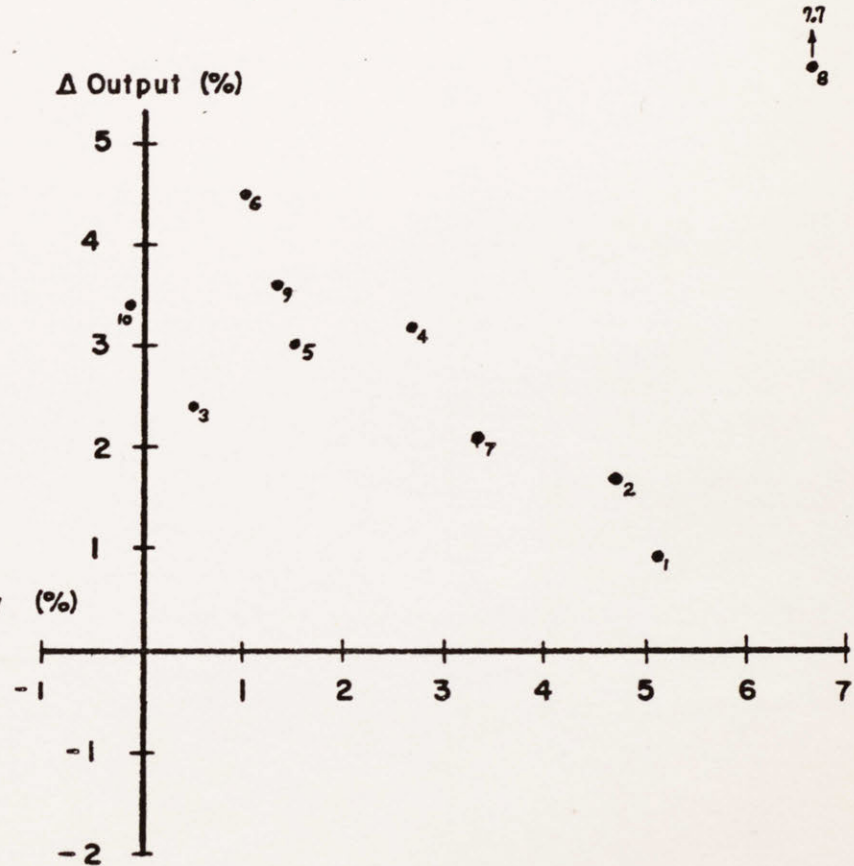
Source: Appendices A-3 and A-5.

Chart II-G

Price Deflator Change vs. Output Change by Industry: 1948-62

(Average Annual Percents)
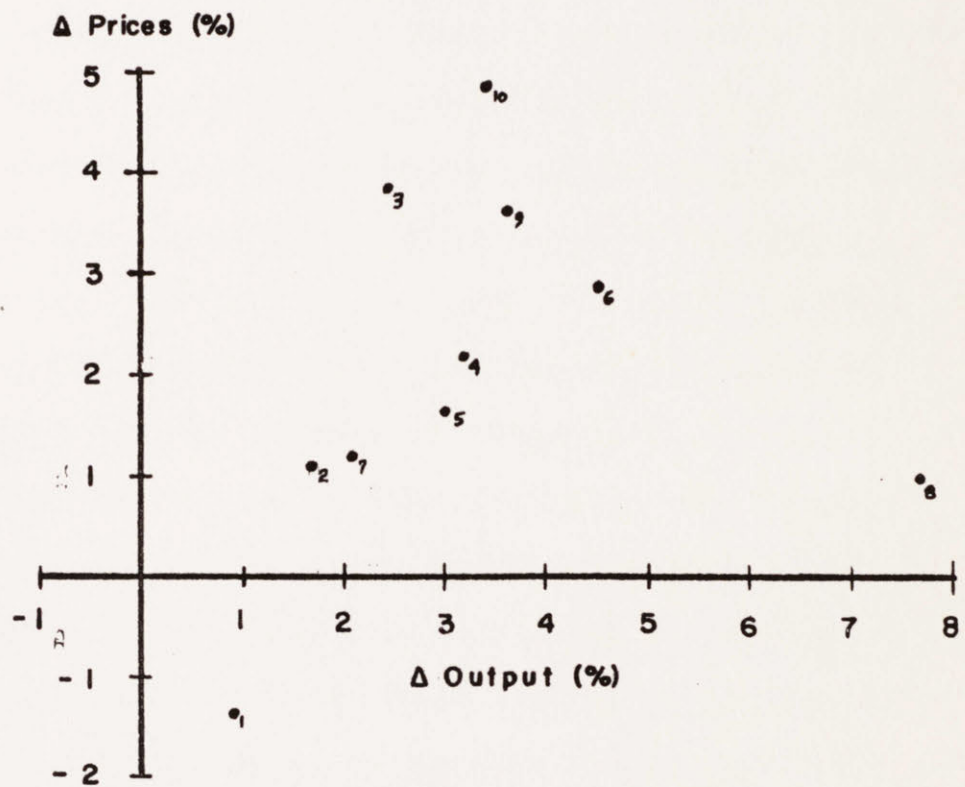
Source: Appendices A-5 and A-7.

in Chart II-E for those sectors with relatively small in-
creases in productivity to have larger increases in price
deflators.

To the extent that these posited tendencies are ac-
curate, the composition of economic activity has been
moving even more rapidly away from the goods producing
sectors than the statistics would indicate. It will be
observed in Chart II-G that it is those sectors with the
larger increases in output that have also experienced the
greater increases in prices. As seen in Table II-D, four
of the five most rapidly growing sectors in terms of em-
ployment increase, Contract Construction (3), Finance, In-
surance, and Real Estate (6), Service (9), and Government
(10) are also those sectors with the largest increase of
price deflators, as can be seen in Table II-C.

It may therefore be concluded that the more rapid
productivity increase - relative price decrease - above
average output increase hypothesis does not correspond to
the postwar experience in the major sectors of the economy.
It is true that faster rates of productivity growth did re-
sult in lower than average price increases. However, those
sectors with the largest price increases (and whose rates of
productivity increased the least) tended to be those sectors
with the largest output increases. The latter finding is
the opposite of what would be expected, given the hypothesis
above. This does not reduce the usefulness of the traditional

static model of a demand curve that gives larger quantity purchased as price falls. It merely means that, over a given period of time, the income effect may be stronger than the relative price effect. It was also found that during the postwar period the sectors with the larger price increases, the larger output increases and the slower productivity increases tended to have more rapid increases in employment. (It will be recalled that during the postwar period the goods producing sectors, whose rates of productivity increase were relatively rapid, lost 14 percent of their share of total output in current dollars or 10 percent of their share in 1954 dollars -- and 18 percent of their share of total employment.) Therefore, the more rapid productivity increase -- relative price decrease -- above average output increase hypothesis may not be used to show that productivity increases do not affect the structure of employment.

It is possible that the above hypothesis does work within a major sector, as it did for the 24 manufacturing industries studied by W. E. G. Salter. John Kendrick[1] also addressed himself to this question, and he discovered a rank correlation of +.33, significant at 1 percent, between

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[1] Op. cit., pp. 189-216. The appendix to Chapter IV of this thesis will analyze some of Kendrick's findings on these pages in more detail.

relative increases in output per manhour and increases in persons engaged for the period 1899 to 1954 for 80 manufacturing industries.[1] Salter's data covered the years 1923-1950. It may be that for manufacturing industries there has been a shift over time, as Kendrick also found not significant rank correlations of -.19 for the period 1937 to 1948 and -.12 for the period 1948 to 1954, when he studied the relationship between increases in output per manhour and increases in persons engaged.[2]

For the purposes of this thesis it is not necessary to examine changes within an industrial sector such as manufacturing, because the ultimate objective of this research is to relate changes in the occupational structure with educational requirements. The fact that the occupational structures of the ten major sectors differ from one another is the rationale for conducting the analysis at the sectoral level.

The difference between Kendrick's long-run findings and his findings for the more recent periods 1937-48 and 1948-54 were so interesting that an association between productivity increases and employment changes was made for the

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[1]Kendrick, op. cit., p. 216.

[2]Idem.

manufacturing sector at the SIC 2 digit level for the period 1948-63. This relationship is shown in Chart II-H. It will be seen that there is almost a zero correlation[1] between productivity increases and employment changes. It can therefore be seen that the productivity increase-- relative price advantage -- relative employment increase theory has not worked even within the manufacturing sector during the postwar period.

Summary

Aggregate productivity rates of the postwar period were treated in the first section of this chapter. First, the relationship between productivity, labor input and economic growth was made explicit. Then, after making due allowance for the nature of the raw data, the rate of productivity increase of the postwar period was compared with long-run U.S. rates. It was found that the rate of productivity increase for the total private economy was faster for the period 1948 to 1963 than it was for earlier and longer periods in the twentieth century.

The second section of this chapter examined the relationship between productivity increases and changes in employment by industrial sector during the period 1948-62. It was ob-

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[1] $r_{rank} = 0.04.$

Chart II-H

Employment Change vs. Productivity Change for
Manufacturing Industrials: 1948-63

(Average Annual Rates)

numbers are SIC identification
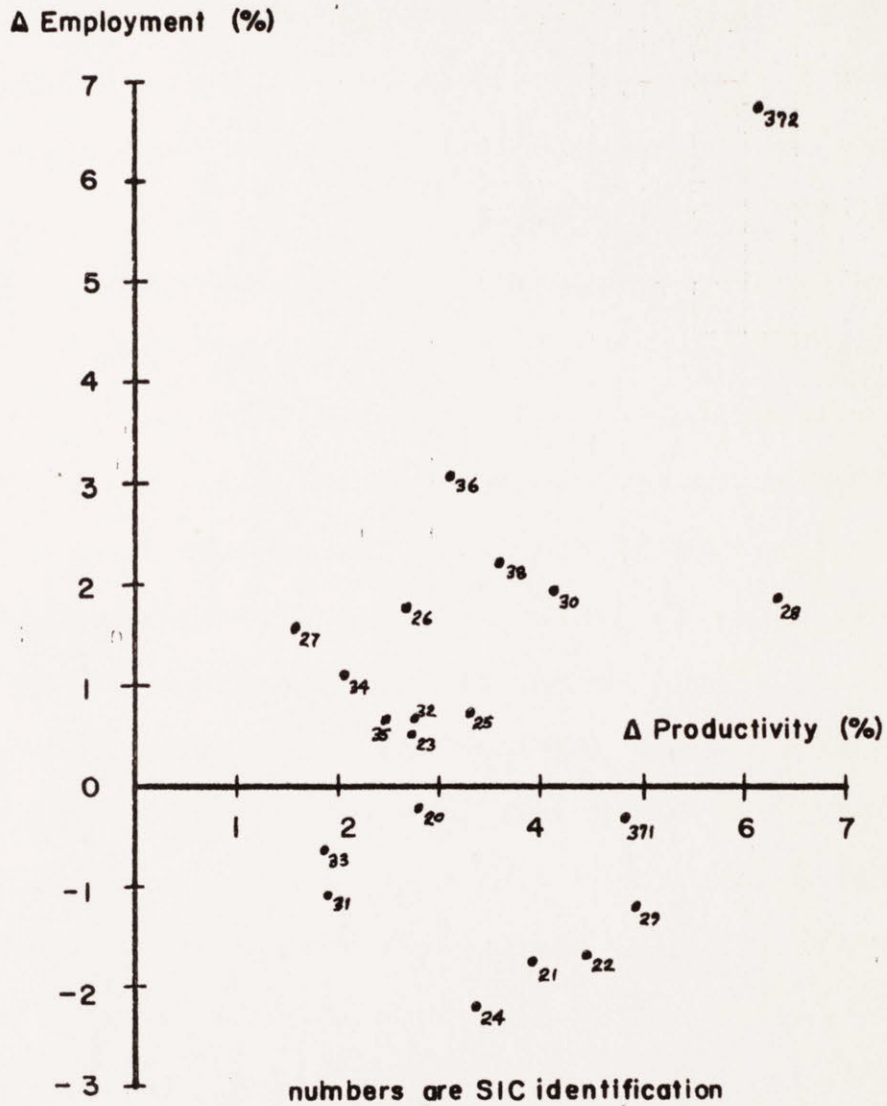
Source: Appendix A-6.

served that relative productivity change was only one of
the variables to be studied when an analysis is made of the
changes in employment by industrial sectors. It is expected
that above average productivity increases will lead to a
relative price advantage and thereby contribute to an in-
crease in output. Productivity increases for the total
economy have an income effect as per capita wealth in-
creases, and it was posited that this income effect may work
in the opposite direction of the price effect. The net
result of the interrelationship of these variables was that
those industrial sectors with faster productivity increases
tended to experience smaller increases in employment.
This was the experience of the period 1948-62 and also of
the longer period 1929-61 as calculated by Victor Fuchs.[1]

Cyclical limitations and the quality of price deflators
were seen to be weaknesses in this analysis that should be
considered when evaluating the findings. The findings con-
flicted with the long-run work of John Kendrick,[2] who
reached the conclusion that productivity increases led to
relative price advantage, above average output increases
because of price elasticity, and relatively greater employment

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[1]Fuchs, op. cit., p. 17.

[2]Kendrick, op. cit., p. 189.

increases. The only support in this chapter for Kendrick's conclusion is that, in fact, during the postwar period those sectors with more rapid increases in productivity did experience a relative price advantage. However, output in both real and current dollars increased relatively in favor of the sectors with slower productivity increases and more rapid increases in price deflators. This interesting indication of change in the long-run functioning of the economy deserves further attention.

It was the goods sectors that tended to have the more rapid increases in productivity, and this shifted the proportion of total employment toward the non-goods sectors. Some consequences of this shift from goods to non-goods employment will be analyzed in the following chapter.

CHAPTER III

SHIFTS IN THE INDUSTRIAL AND OCCUPATIONAL STRUCTURE

OF THE LABOR FORCE: RATE AND DIRECTION

Plus ca change, plus c'est la meme chose?

The Subcommittee on Employment and Manpower of the Committee on Labor and Public Welfare, Eighty-Eighth Congress, chose to title its recent set of hearings the Nation's Manpower Revolution.[1] When Senator Joseph Clark began the hearings on May 20, 1963, after referring to the Luddites of seventeenth century England to demonstrate that unemployment as a result of the introduction of machines was not a new phenomenon, he stated, "But we suspect that the changes now taking place in our national manpower needs are new . . . "[2] Is the country experiencing a "revolution" or merely an "evolution"? At what rate of change does "evolution" end and "revolution" begin?

This chapter will first analyze the changes that have taken place in the industrial structure of employment.[3]

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[1] Op. cit..

[2] Ibid., p. 1. Emphasis added.

[3] Perhaps it is appropriate to observe that this chapter will utilize only employment data. Unemployment is a relatively poorly defined residual that tends to be given more attention than its accuracy warrants. As chapter IV will show, a much more accurate picture of shifts in structure may be obtained from employment change rather than from the unemployment data.

The shift away from the goods producing sectors, during the postwar period has been partially described in Chapter II. The rate and direction of the postwar shift in the industrial structure will now be analyzed, and the experience of the postwar period will be compared with the history of selected periods in the twentieth century. Next, the relationship between industrial and occupational change will be analyzed. The shift from blue collar to white collar employment is primarily a function of two variables: (1) the shift away from the goods producing sectors which are predominately blue collar, and (2) the shift from blue collar to white collar employment within the industrial sectors. The net result of these two forces is therefore the change in the occupational structure of employment.

It will be seen that the rate of change in the occupational and industrial structures has been faster in the postwar period than in other periods of the twentieth century. This information by itself does not answer the question of "evolution" or "revolution," nor does it answer the often-raised and very serious question of whether the labor force supply is adjusting rapidly enough to accomodate the postwar changes in the labor market.[1] To the extent

[1] See _Higher Unemployment Rates, 1957-60: . . . op. cit._, R. A. Gordon, "Has Structural Unemployment Worsened?" _Industrial Relations_, Vol. 3, May 1964; and Charles Killingsworth, _op. cit._, for research that has posed this question. This thesis will return to the question in Chapter IV.

that there are structural problems of adjustment (whether or
not these problems are getting more serious), a knowledge
of the direction and rates of change in the employment
structure is useful.

Shifts in the Industrial Structure

The focus of interest in this section will be the rate
and direction of changes in the industrial structure.
The economy is divided into the ten major sectors used in
the analysis of productivity in Chapter II. Each sector
has a level of employment at the beginning and end of a
period. It is possible therefore to calculate for this
period the annual compound rate[1] of change in the employment
of each sector. It is generally accepted that the direction
of change has been toward the non-goods sectors and away
from the goods sectors[2] during the postwar period. What is
of interest in this section is whether the nature of the
changes has been different either in rate of change or in

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[1]If time periods of equal length were to be compared,
it would be easier to calculate (and perhaps to comprehend)
if the total percentage change was the only measure used (i.e.
$\dfrac{\text{Period}_1}{\text{Period}_0} - 1$). Since time periods of unequal length will be
used in this analysis, the annual compound rate of change will
be utilized (i.e. $P_1 = P_0 (1 + r)^n$ which converts to the
familiar $r = \text{antilog} \dfrac{\log P_1/P_0}{n} - 1$ where
n = length of period and P_1 and P_0 are the two terminal points
of the period.

[2]Industrial sectors that are classified goods sectors
in this thesis are: (1) agriculture, forestries, and fisheries,
(2) mining, (3) contract construction, (4) manufacturing

the consistency of change in the postwar period as compared with the long-run history of the twentieth century. "Consistency" can be seen from the proportion of the group of goods producing sectors that has been losing its share of employment. That is, of the five goods producing sectors, how many lost in proportion of employment between 1899 and 1948; how many lost ground between 1948 and 1962?

It might be expected that the faster and more consistent the shift away from the goods sectors has been, the larger would be the necessary shift in the adjustment of the labor force to the new structure of employment. Because the interest is in the probable magnitude of labor force adjustment that would appear to be necessary given a shift in the employment structure, a method of calculating the magnitude of the structural change is necessary. One possibility is to compute annual compound rates of change in employment between various subperiods of the twentieth century and then compare the rates of change by industrial sector. This is done in Chart III-A for the periods 1899-1948 and 1948 to 1962. It can be seen that the movement away from the goods producing sectors (1), (2), (4), (7) presented a more consistent pattern of shift in the postwar period than was the case during the longer period 1899-1948. The only goods producing sector to not lose in share of employment during the postwar period was contract construction (3).

[(4a) production workers in manufacturing], and (7) transportation. Non-goods sectors are: (5) wholesale and retail trade, (6) finance, insurance, and real estate, (8) communications and public utilities, (9) services, and (10) government. The numbers represent the same coding used in Chapter II. This coding will also be sued in charts in Chapter III.

Table III-A

Industrial Sector Employment Trends: Selected Periods, 1899-1962

Sector	Average Annual Percentage Change of Employment				Distribution of Employment			
	1929/1909	1962/1899	1948/1899	1962/1948	1929/1909	1962/1899	1948/1899	1962/1948
All Industries	1.6	1.6	1.7	1.1	---	---	---	---
(1) Agriculture, Forestry, and Fisheries	-0.2	-0.9	-0.4	-2.9	-1.8	-2.4	-2.0	-3.8
(2) Mining	-1.1	0.0	0.9	-3.2	-1.7	-1.6	-0.8	-4.1
(3) Contract Construction	1.6	1.9	1.9	1.9	0.0	0.4	0.2	0.8
(4) Manufacturing	1.6	1.8	2.2	0.5	0.0	0.3	0.5	-0.5
(4a) Production Workers	1.6	---	---	-0.2	0.0	---	---	-1.2
(5) Wholesale and Retail Trade	3.4	2.6	2.9	1.5	1.8	1.0	1.2	0.4
(6) Finance, Insurance, and Real Estate	5.4	3.7	3.7	3.6	3.7	2.1	2.0	2.4
(7) Transportation	0.6	0.5	0.9	-1.1	-0.9	-1.1	-0.7	-2.2
(8) Public Utilities and Communication	5.3	3.5	4.2	0.9	3.7	1.9	2.6	-0.2
(9) Services	2.1	1.9	1.8	2.3	0.5	0.4	0.1	1.2
(10) Government (including military)	3.6	3.7	3.8	3.5	1.7	2.2	2.1	2.4

Note: Percentage calculated by compound growth between terminal points.

Source: Appendices C-2 and C-3.

Chart III-A

Employment Change by Industry: 1899-48 and 1948-62

(Average Annual Percent)
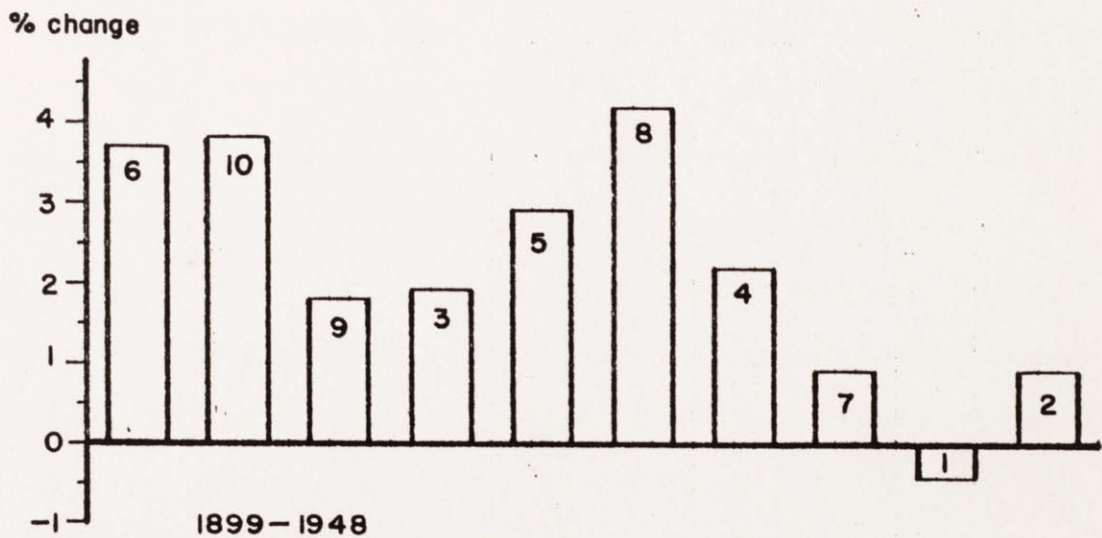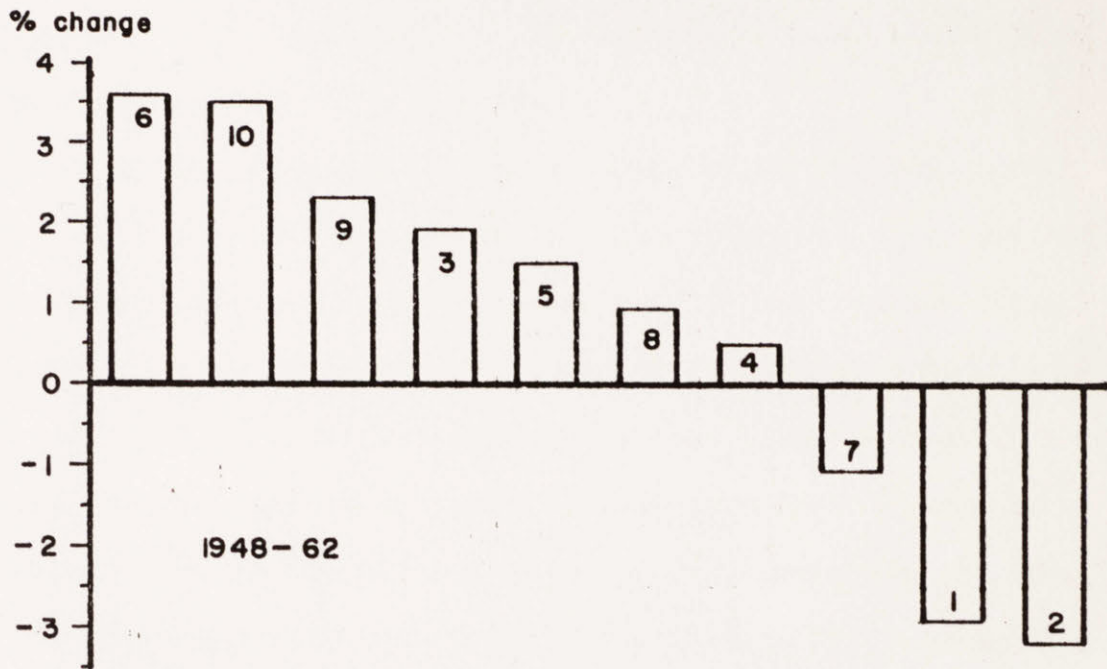
number in bar indicates industry.

Source: Table III-A.

Manufacturing (4), mining (2) and transportation (7) grew, during this period, whereas these sectors declined during the postwar period. Agriculture (1) was the one goods sector that decreased in employment during the long period 1899-1948 and did so at the relatively slow annual rate of -0.4 percent, in contrast to the annual rate of decrease in the postwar period of 2.9 percent.

The annual compound rates of change in the employment levels for selected subperiods of the twentieth century are presented in Table III-A. Also given in that table are the annual rates of change in the proportion of total employment held by each industrial sector. The change in the proportions of employment held by the industrial sectors is perhaps a more useful measurement for observing the magnitude of the shifts in the industrial structure, because the changes in proportions are not distorted by differences between periods in the total rate of growth. Total employment grew more rapidly between 1899 and 1948 than it did between 1948 and 1962, and this has affected all of the relative changes. The utilization of rates of growth in absolute employment can hide changes in structure. A sector can increase in employment, but lose in proportion of total employment if its rate of increase is slower than the increase in total employment for the economy. Chart III-B presents the relative changes in proportion between 1899 and 1948 and 1948 to 1962. The relatively faster

Chart III-B

Change of Employment Proportions by Industry: 1899-1948 and 1948-62
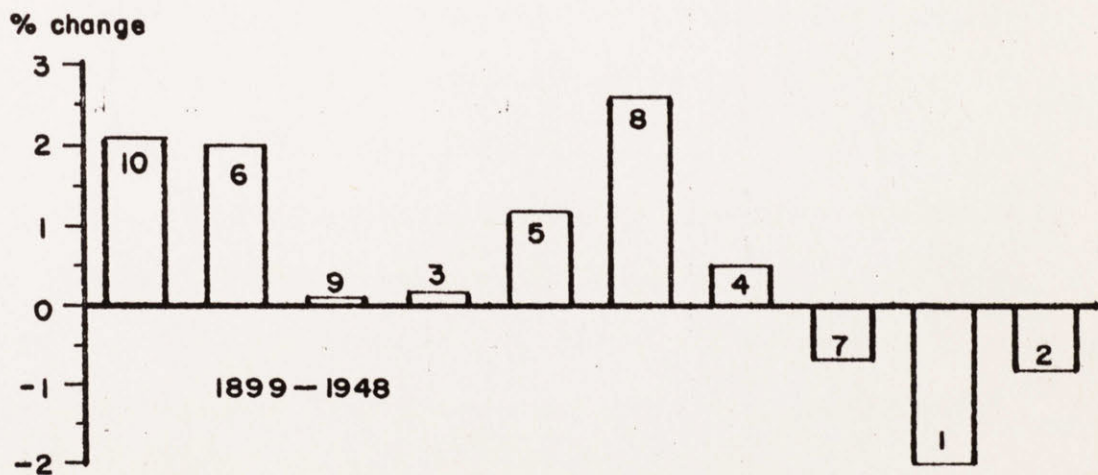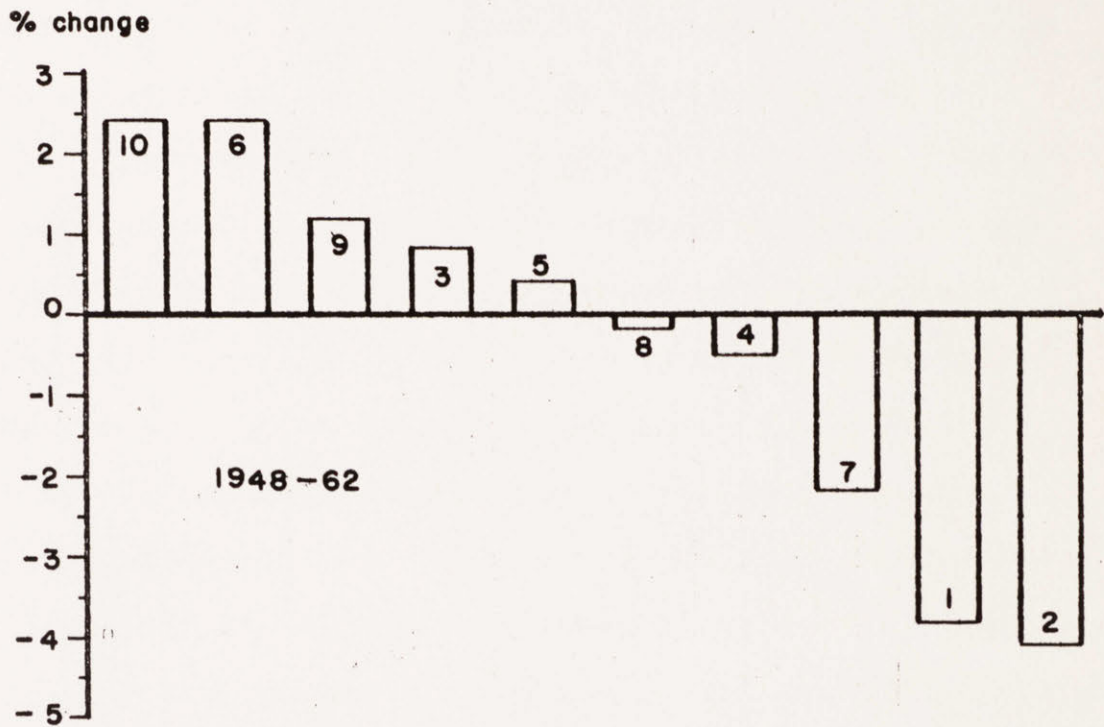
Source: Table III-A.

structural changes away from the goods sectors can be seen with somewhat greater clarity in this chart.

A third method for presenting differences between the periods 1899-48 and 1948-62 in the rate and direction of structural change is to show shifts in proportions weighted by the average employment in the period. An economy must adjust to a change in its structural proportions, and this concept of weighted change is a useful approach for analyzing the magnitude of the change in structure. An example may help to demonstrate the better perspective provided by this method. Mining (2) had 1 million workers in 1948, and 630 thousand in 1962, a decrease of 35 percent. Although this was a substantial decrease, it had little effect on the employment structure as measured in proportions. If manufacturing (4), for example, had a decrease of only 10 percent in employment between 1948 and 1962, such a change would have caused 4 times the amount of restructuring of the employment proportions that the 35 percent decrease in mining caused. The comparison between the periods 1899-48 and 1948-62 by weighted changes of structural proportions is presented in Chart III-C.

This change in proportions of the employment structure can be related to the findings of Chapter II. It will be observed that the only goods producing sector which did not lose in its share of employment was contract construction (3).

Chart III-C

Weighted Change of Employment Proportions by Industry:
1899-1948 and 1948-62

Index of change

1948 - 1962

Index of change

1899 - 1948

Index of change (weighted) =

$$\frac{(\% \text{ Total Employment})_{yr \ 1}}{10} \times \begin{array}{l} \text{Annual \%} \\ \text{change of} \\ \text{proportions} \end{array}$$
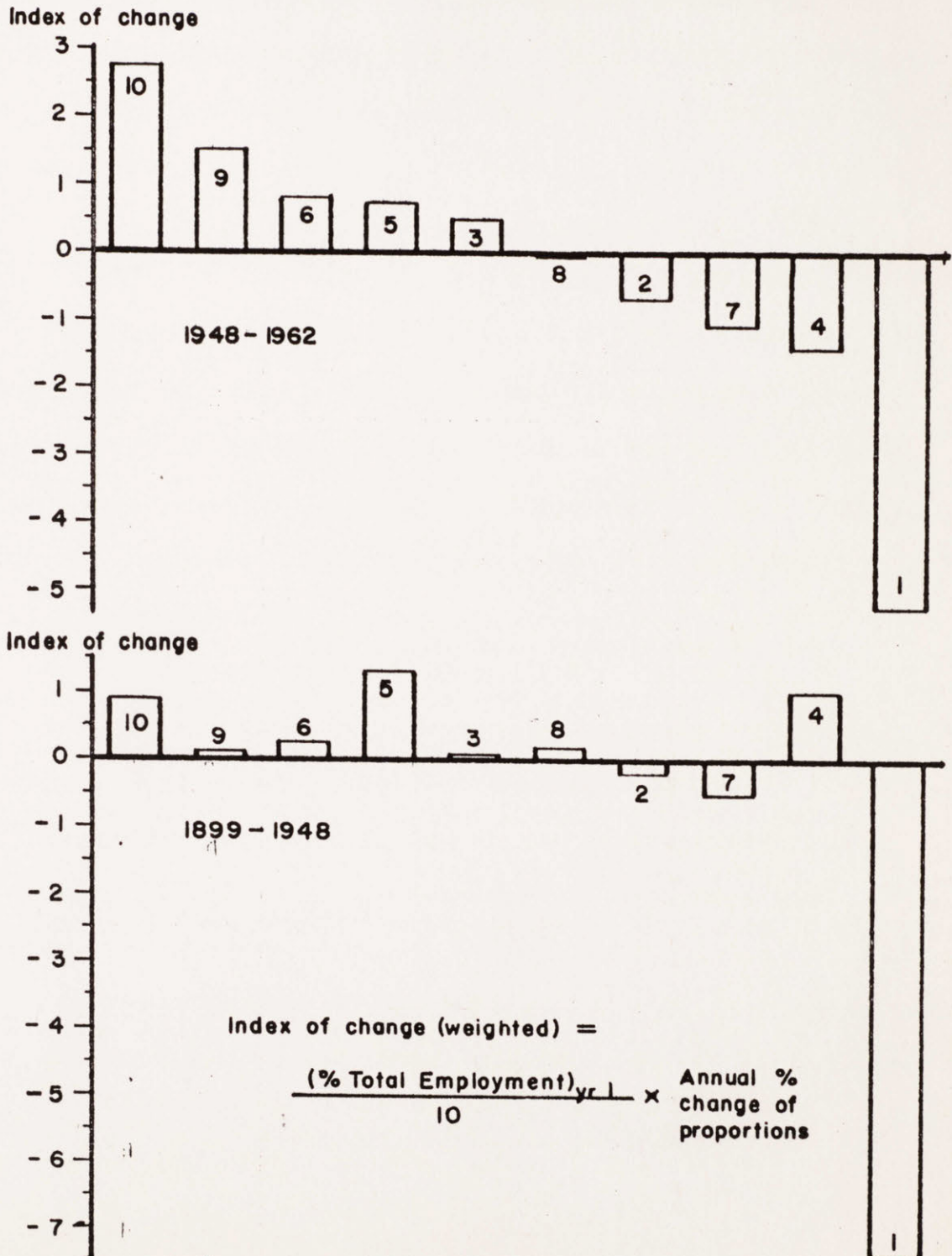
Source: Appendix C-2 and Table III-A.

All of the other goods producing sectors ((1), (2), (4),
and (7)) lost quite substantially in proportion of employ-
ment during the postwar period, and these sectors were also
the ones with above average increases in productivity in
contrast to contract construction (3), which was substan-
tially below average in productivity increase during the post-
war period.

The Cyclical Limitation

The level of unemployment was 3.8 percent in 1948 and
5.6 percent in 1962.[1] One might be concerned about com-
paring rates of change in a period with such a difference
in economic activity between the terminal points. John N.
Henderson discusses this cyclical effect as follows:

> . . . yearly data on employment patterns, such
> as those of the BLS, indicate that there is con-
> siderable cyclical movement in the industrial
> composition of employment, with the result that
> service occupations rise as a percentage of total
> employment in recessions or periods of less than
> full employment. Each of the recent Census
> years (1930, 1940, and 1950) had a sizeable por-
> tion of unemployment, and it is by no means clear
> that the long-run trend of the tertiary indus-
> tries is entirely consistent with the industrial
> pattern that emerges when decennial data are used.[2]

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[1]Manpower Report of the President, 1964 (Washington, D.C.:
Government Printing Office, 1964), p. 195. The 1948 rate has
been adjusted for definitional changes adopted in January, 1957.

[2]"Comparability of Estimates of the Industrial Distribution
of Employment," Review of Economics and Statistics, Vol. XLIII,
No. 1 (February 1961), p. 36.

If one were concerned with proportions of employment at one period of time, then this cyclical effect would be of serious consequence. The warning of Dr. Henderson is very important if the purpose of a study is extrapolation from past trends. Then a difference in cyclical activity between the terminal points from which a rate of change is calculated could cause a very significant distortion in the extrapolation.[1] The interest of the analysis presented in this thesis is to examine the magnitude of the structural

---

[1]The magnitude of a distortion of 1 percent in the change in the proportion between the terminal points of a period can be calculated as follows.

(1) $\dfrac{P_1}{P_0} = (1 + r)^n$ Basic compound interest formular

(2) $\dfrac{P_1}{P_0} + \dfrac{.01P_1}{P_0} = (1 + r')^n$ Add 1 percent to terminal point

(3) $\dfrac{.01P_1}{P_0} = (1 + r')^n - (1 + r)^n$ equation (2) - (1)

Then
(4) $.01 (1 + r)^n = (1 + r')^n - (1 + r)^n$ by substitution

(5) $1.01 (1 + r)^n = (1 + r')^n$

(6) $1.01^{1/n}(1 + r) = (1 + r')$

(7) $r' = (1.01^{1/n}) - 1 + (1.01^{1/n}) r$

$\therefore$ (8) $r' - r = \Delta r = (1.01^{1/n} - 1)(1 + r)$

It is thus seen that the importance of the cyclical distortion is a function of three variables: (1) the initial rate of change (r); (2) the number of years between the terminal periods; and (3) the amount of the cyclical distortion, in the example given of a 1 percent differential distortion, the effect decreases as n becomes larger as the following demonstrates:

For n = 1; $\Delta r = .01 + .01\ r$
n = 2, $\Delta r = .00498 + .00498\ r$
n = 5, $\Delta r = .00199 + .0199\ r$
n = 10, $\Delta r = .000996 + .000996\ r$
n = 15, $\Delta r = .000665 + .000665\ r$

changes between time periods in order to examine the nature of the adjustment process. Increases in cyclical strength should be expected to work in the favor of the goods producing sectors. The cyclical limitation of this research, therefore, is not that the changes between the periods under investigation are incorrect; it is that the results may not be extrapolated without factoring in the probable distortion caused by the differences in cyclical activity between the terminal points of the period under investigation.

The Relationship between Industrial Shifts
and the Occupational Structure

The training requirements of employment are related to occupations. Industrial sectors have different occupational compositions. Blue collar employment predominates in the goods sectors; white collar employment predominates in the non-goods sectors. Therefore, a shift in the industrial structure from goods to non-goods may lead to a shift toward the white collar occupations. This shift toward white collar employment has been widely recognized, and it is the purpose of this chapter to attempt to quantify the causes of the shift.

This analysis uses the following definitions of goods and non-goods, white and blue collar.

SECTORS

GOODS   NON-GOODS

Agricultural, Forestry   Communications and Public
  and Fisheries   Utilities
Mining   Wholesale and Retail Trade
Construction   Finance, Insurance and
                                  Real Estate
Manufacturing   Services
Transportation   Government

The following is the classification of occupations

into blue collar and white collar groups utilized in this

study:

OCCUPATIONS[1]

WHITE COLLAR   BLUE COLLAR

Professional   Farmers, Farm Managers,
                                      Farm Laborers
Managers   Craftsmen
Clerical   Operatives
Sales   Laborers excluding Farmers

The list of occupations does not include the sector

of service occupations.[2] This omission is based on the

fact that the service sector is a very mixed occupational

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[1]The division of occupations into blue collar and white
collar does not follow a common format that has white col-
lar, blue collar, service and farm as the four types of oc-
cupational divisions. In this case, service workers are
excluded and the farm classification has been added to blue
collar.

[2]An analysis of the shift in employment with service
workers included may be found in appendices C-8, C-9 and
C-10.

group[1] that does not have the customary relationship to blue or white collar classification.

The occupational structure of the industry groups is presented in Table III-B.

Table III-C gives the matrix of employment composition (percentage of total employment) in 1950 and 1960. Differences between 1950 and 1960 quantify the net changes during the period. It is observed that the proportion of total employment held by the goods sectors decreased from 56 percent in 1950 to 51 percent in 1960. The proportion of blue collar employment (to total employment) decreased from 60 percent in 1950 to 53 percent in 1960.

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[1] The U.S. Bureau of the Census, 1960 Census of Population, Classified Index of Occupations and Industries (Washington, D.C.: Government Printing Office, 1960), p. xxiv, defines this occupation as seemingly closer to blue collar. Service workers, including private household. Barbers. Protective service workers: includes guards, watchmen, and doorkeepers, marshalls and constables, sheriffs and bailiffs; and bridge tenders; firemen, fire protection, policemen and detectives, baby sitters; housekeepers; laundresses, boot blacks; chamber maids and maids; charwomen and cleaners, cooks, counter and fountain workers; elevator operators; hairdressers and cosmetologists; stewards; janitors and sextons; kitchen workers; midwives; porters; practical nurses; ushers; and waiters.

Table III-B

Matrices of Employment by Industrial and Occupational Groups: 1950 and 1960

(in thousands of employees)

Occupational Group

Industrial Group	1950		
	White Collar	Blue Collar	Total
Goods	4,903	23,394	28,297
Non-goods	15,514	6,960	22,474
Total	20,417	30,354	50,771

Industrial Group	1960		
	White Collar	Blue Collar	Total
Goods	6,752	21,915	28,667
Non-goods	19,744	8,184	27,928
Total	26,496	30,099	56,595

Note: Service Occupation excluded from group.
Source: Appendix C-8.

Table III-C

Matrices of Employment Composition by Industrial
and Occupational Groups: 1950 and 1960

(percentage of total employment)

Occupational Group

Industrial Group	1950		
	White Collar	Blue Collar	Total
Goods	9.7	46.1	55.8
Non-goods	30.6	13.7	44.3
Total	40.2	59.8	100.0

Industrial Group	1960		
	White Collar	Blue Collar	Total
Goods	11.9	38.7	50.6
Non-goods	34.9	14.5	49.4
Total	56.8	53.2	100.0

Note: Service occupation excluded from group.
Source: Calculated from Table III-B.

To examine the impact of the shifts among all variables

within the matrix, it is necessary to analyze the changes

under different assumptions.[1] The first assumption, and

1.

The assumptions are necessary since to solve completely
for all the changes simultaneous equations are needed. Un-
fortunately, only the net change of the employed is known,
and to solve with less knowns than unknowns requires some
assumptions as to where the additional labor force was allo-
cated.

the most naive, is that the additional employment was dis-
tributed proportionally (using 1950 as base) between the
goods and non-goods sectors. An additional assumption is
that the ratio of white collar to blue collar employees re-
mained the same as in 1950. Thus the 1950 matrix of Table
III-C would also represent the percentage distribution
matrix in 1960. The 1960 matrix of absolute numbers is pre-
sented in Table III-D, which may be compared to actual employment given in
1960 matrix in Table III-B. Blue collar employment in the
goods sectors would have been 19 percent higher (26/22
million) and total blue collar employment would have been
12 percent higher (34/30 million) under the stated assumptions.

Table III-D

Matrix of Employment in 1960 Assuming 1950 Proportions

(in thousands of employees)

Occupational Group

Industrial Group		White Collar	Blue Collar	Total
	Goods	5,467	26,079	31,546
	Non-goods	17,289	7,760	25,049
	Total	22,755	33,839	56,595

Note: May not add to totals because of rounding.
Source: Calculated by author.

Relaxing the assumption that the new employment is distributed proportionally between the industrial sectors, but keeping the second assumption that the blue/white collar proportions remain constant, leads to the 1960 matrix shown in Table III-E.

Table III-E

Matrices of Employment and Employment Composition Using 1950 White Collar/Blue Collar by Industrial Group in 1960

Occupational Group
Employment
(in thousands of workers)

	White Collar	Blue Collar	Total
Goods	4,968	23,699	28,667
Non-goods	19,276	8,652	27,928
Total	24,244	32,351	56,594

Employment Composition
(in percentage of total employment)

	White Collar	Blue Collar	Total
Goods	8.8	41.9	50.7
Non-goods	34.1	15.3	49.4
Total	42.9	57.2	100.0

Goods: White Collar = 17.3%; Blue Collar = 82.7%
Non-goods: White Collar 69.0%; Blue Collar = 31.0%

Source: Calculated by author.

The total decrease of blue collar proportions between 1950 and 1960 was 11 percent $(\frac{59.79 - 53.18}{59.79})$. Of this total change, approximately 4 percent $(\frac{59.79 - 57.2}{59.79})$ can be explained by the shift from goods to non-goods. The difference of 7 percent is an approximation[1] of the shift from blue collar to white collar employment within the major industrial divisions. This procedure for the calculation of relative effects can be used to study the changes away from blue collar employment in the goods industrial division. The total decrease in the blue collar proportion was 16 percent $(\frac{46.08 - 38.72}{46.08})$. The shift due to changes from goods to non-goods employment accounted for 9 percent $(\frac{46.08 - 41.87}{46.08})$ thereby leaving 7 percent to be explained by the shift from blue collar to white collar employment within the sectors.

Another way to analyze the changes from blue to white collar employment is presented in Table III-F. In order to explain the calculations presented in Table III-F, the example of white collar workers in the goods producing sector is given. It will be observed that the change in:

---

[1]This assumes that the result of changing both simultaneously would have a small cross product term.

Table III-F

Calculation of the Components of Change in Employment and Occupational Sectors Between 1950 and 1960

(Service Occupations Excluded)

EMPLOYMENT	(1) 1950	(2) 1960	(3) % Change	(4) National Growth	(5) Sector Growth	(6) Growth Due to Shift	(7) Total Change
	(in 000's)				(in (000's)		(in 000's)
United States, total	50,771	56,594	11.5				
Goods producing sector	28,297	28,666	1.3				
White Collar	4,903	6,752	37.7	564	-500	1,785	1,849
Blue Collar	23,394	21,915	-6.3	2,690	-2,386	-1,778	-1,474
GOODS--TOTAL				3,254	-2,886	7	375
Non-goods producing sector	22,474	27,928	24.3				
White Collar	15,514	19,744	27.3	1,784	1,986	465	4,235
Blue Collar	6,960	8,184	17.6	800	891	-466	1,225
NON-GOODS--TOTAL				2,584	2,877	- 1	5,460

Columns: 1 and 2   Census data
         3   Percentage Change between 1950 and 1960
         4   Column 1 times the national growth rate
         5   Column 1 times (the sector rate - the national rate)
         6   Column 1 times (the occupation rate - the sector rate)
         7   Columns 4 + 5 + 6

Table III-F (cont'd)

This method of calculation was utilized by Lowell D. Ashby in "The Geographical Redis-tribution of Employment: An Examination of the Elements of Change," <u>Survey of Current Business</u>, October 1964, pp. 13-20.

Source: Appendix C-8.

number of workers in class was   + 37.7 percent

number of workers in sector was   1.3 percent

number of workers in country   11.5 percent

If the national growth rate (11.5 percent) is spread evenly over all sectors, then it would be expected that white collar workers in the goods sector would have increased by 11.5 percent or by the 564,000 (the 1950 base of 4,903,000 x 0.115) seen in column 4. If white collar workers grew in the goods producing sector at the same rate as total employment in the goods producing sector, then the difference between the national rate and the sector rate (11.5 - 1.3) (0.115 - 0.013) times the base stock in column 1 (4,903,000) gives the sector effect (-500,000) seen in column 5. Then if the sector rate is subtracted from the white collar rate in the goods producing sector (0.377 - 0.013) and if this difference is multiplied by the base in 1950 (4,903,000), the result is the shift from blue collar to white collar employment in the goods producing sectors.

A summary of the two effects is as follows. White collar employment would have increased by 564,000 workers in the goods producing sectors if there had been no substitution[1]

[1]This should not be considered as direct substitution because there are other variables that should be considered such as changes within the goods producing sectors. Preliminary work on a finer sector analysis indicates that the sectors utilizing proportionally more white collar employees have been expanding faster than the sectors with a smaller white collar proportion.

of white collar for blue collar and if the goods producing
sector had increased at the rate of the total economy. In
fact, white collar employment grew by 500,000 fewer workers
because the goods producing sector grew slower than total
employment. Because of the shift from blue collar to
white collar employment within the goods producing sector,
white collar employment increased by 1,785,000 workers.

The shifts in employment may now be summarized. In
the goods producing sector, white collar workers increased
by -500,000 and blue collar workers by -2,386,000 then
would have been the case if the goods producing sector had
increased in employment at the national average of 11.5 per-
cent. White collar workers increased by 1,785,000 and blue
collar workers by -1,778,000 because of the greater (37.7
percent) than sector (1.3 percent) increase in white col-
lar workers and a less (-6.3 percent) than goods sector (1.3
percent) increase for blue collar workers.

In a similar manner, in the non-goods sector white
collar workers increased by 1,986,000 and blue collar
workers by 891,000 because the non-goods sector rate of 24.3
percent was faster than the national rate of 11.5 percent.
There was an additional increase in white collar employment
of 465,000 workers while blue collar employment was less by
466,000 workers, because white collar employment increased
at a faster rate (27.3 percent) and blue collar employment
at a slower rate (17.6 percent) than the rate of increase

(24.3 percent) for the total non-goods sector.

Shifts in the Occupational Structure

Once again, what is of interest for this research is the rate and direction of structural change. In the previous section, the relationship between industrial and occupational shifts was analyzed. The shift from blue collar to white collar employment was found to result from two trends. First, there was the movement away from the goods producing sectors and toward the non-goods sectors. This contributed to the shift from blue collar to white collar employment because blue collar employment predominates in the goods sectors and therefore a shift away from goods employment also creates a shift away from blue collar employment. The magnitude of this contribution to the total blue collar to white collar shift was presented in the previous section.

The second contribution to the occupational shift was found to be that, within both the goods and non-goods aggregates, there had been a shift from blue collar to white collar employment. In order to provide further insight into the nature of the shift from blue collar to white collar employment, it may be helpful to disaggregate conceptually

into three components.[1]

The first of these three components occurs when there is a shift between sectors within either the goods or non-goods aggregate such that a sector with a relatively high proportion of white collar employment grows faster than a sector with a low proportion of white collar employment. Within the goods sector, for example, manufacturing composed 50.3 percent of goods employment in 1950, and agriculture had 24.9 percent. In 1960, manufacturing had 60.3 percent, and agriculture had 14.9 percent of total goods employment.[2] The greater importance of manufacturing within the goods division affected the blue collar/white collar relationship because manufacturing had 23.6 percent of its total employment in white collar occupations in 1950, while agriculture had only 1.3 percent in white collar.[3]

Shifts of subsections within a major sectoral component of either goods or non-goods divisions is the second contributor to the shift from blue collar to white collar. This

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[1]Work has begun on quantification of the contribution of each of these three components of the aggregative shift. This will be of interest, but it is not believed to be necessary at this point to go quantitatively beyond the level of aggregative analysis used in this thesis in order to relate productivity, education, and changes in the labor force.

[2]Calculated from appendix C-6.

[3]See appendix C-7.

is similar to the previous factor, contribution one, but it is one level of aggregation lower. In manufacturing, for example, chemicals increased from 4.54 percent of total manufacturing employment in 1950 to 4.89 percent in 1960 in contrast to furniture and fixtures which went from 2.24 percent in 1950 to 2.14 percent in 1960. This switch within the major sector of manufacturing had an effect on the trend from blue collar to white collar employment because chemicals had 37.9 percent white collar employment in 1950 while furniture and fixtures had but 15.5 percent white collar. A production function shift within a subsection is the third phenomenon that contributes to the shift from blue collar to white collar employment. An example of this would be the fact that white collar employment within the chemical subsection grew from 37.9 percent of total employmemt in 1950 to 43.5 percent in 1960.[1]

The total effect in manufacturing of contributors two and three may be seen in Table III-G. Here it will be observed that the proportion of white collar to total manufacturing employment increased from 23.6 percent in 1950 to 28.4

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[1]U.S. Dept. of Commerce, Bureau of the Census, U.S. Census of Population 1950, Special Report P-E No. 1D (Industrial Characteristics), pp. ID-34 & 36; and _____, U.S. Census of Population 1960, Subject Report PC(2) - 7C (Occupation by Industry), pp. 17 & 57. Calculated from given data.

Table III-G

Manufacturing Employment by Occupation

1950 and 1960

		Employment in 000's		Employment Distribution			% Increase in Employment
		1950	1960	1950	%	1960	1960/1950
A	Total	14,453	17,530	100.0		100.0	21.3
B	Professional, Technical and Kindred	701	1,323	4.8		7.5	88.7
C	Managers, Officials, and Proprietors (except farm)	691	892	4.8	23.6 28.4	5.1	29.1
D	Clerical and Kindred	1,585	2,097	11.0		12.0	32.3
E	Sales Workers	428	658	3.0		3.8	53.7
F	Craftsmen, Foremen and Kindred	2,822	3,435	19.6		19.6	21.7
G	Operators and Kindred	6,617	7,487	45.8		42.7	13.1
H	Laborers, except Farm and Mine	1,269	1,038	8.8		5.9	-18.2
I	Private Household	0	0	0.0		0.0	0.0
J	Service Workers except Private Household	273	286	1.9		1.6	4.8
K	Farmers, Farm Managers	0	0	0.0		0.0	0.0
L	Farm Laborers and Foremen	0	0	0.0		0.0	0.0
	Not reported	68	312	0.5		1.8	358.8

Source: <u>United States Census of Population: 1950</u>, "Occupation by Industry," Special Report, P-E, No. 1C, U.S. Department of Commerce, Bureau of the Census (Washington, D.C.: Government Printing Office, 1954), Table 1, p. 1C-11. <u>United States Census of Population: 1960</u>, "Occupation by Industry," Final Report PC(2)-7C, U.S. Department of Commerce, Bureau of the Census (Washington, D.C.: Government Printing Office, 1963), Table 1, p. 1.

percent in 1960. A more complete quantification of these three contributors to the shift from blue collar to white collar employment will make interesting additional work to this thesis.

One facet of the quantification of these data might be a further understanding of the impact that government actions have had on arresting the trend from blue collar to white collar employment. If there is not great price elasticity for farm products, it is likely that the government price support and purchase programs, "Food-for-Peace," and other such foreign aid activities, and food coupons for the poverty stricken have all kept goods employment up. In 1963 defense expenditures created employment for 3.0 million employees in manufacturing.[1] A substantial proportion of this employment was in R & D activity. It has been estimated that R & D personnel in industry increased from 245,000 in 1951, or 1.5 percent of all those employed in manufacturing, to 803,000 in 1960, or 4.8 percent of total manufacturing employment.[2] The number of professional scientists and engineers engaged in industrial research and development grew

[1]Joseph F. Fulton, "Employment Impact of Changing Defense Programs," Monthly Labor Review, Vol. 87, No. 5 (May 1964), Table 1, p. 510.

[2]Nestor E. Terleckyj in Research and Development: Its Growth and Composition, (National Industrial Conference Board, Studies in Business Economics, No. 82 (New York, 1963), Table 10, p. 39.

from 98,200 in 1951 to 286,800 in 1960. During this period, the federal government increased its financing of industrial R & D from 39 percent in 1953 to 58 percent in 1960. Research and development is also financed by firms hoping for government business, and this should be added to the percentage figures given for government involvement.[1]

George Delehanty has made an able and exhaustive study of the change in the nonproduction/production ratios (N/P). He concluded that: "Of the variation in the absolute changes in the N/P ratios from 1954-1958 . . . about 72 percent is due to the changes in the S E T (Scientists, Engineers, and Technicians) employment ratio."[2] In other words, if the changing ratio[3] of white to blue collar employment is analyzed in manufacturing, it is discovered that the growing importance of R & D explains much of the trend toward white collar employment in this third type of shift contributing to

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[1] Ibid., p. 39.

[2] George Delehanty, An Analysis of the Changing Proportion of Nonproductive Workers in U.S. Manufacturing Industries, Unpublished M.I.T. Ph.D. Thesis, 1962, p. 212.

[3] This accepts an identity between production workers and blue collar employment and nonproduction and white collar employment. This identity is only approximately correct.

the trend. It is therefore possible to give examples of the government arresting the trend away from blue collar (as in agriculture) or in speeding the trend (as in the financing of R & D).

Now that the various factors contributing to the trend from blue collar to white collar employment have been analyzed (but only quantified in total and not yet by component), it is possible to examine the rates of change in the occupational structure. The period 1950-1962 will be compared with the longer period 1900 to 1950 in order to make manifest the acceleration of long-run trends in the postwar period.

Table III-H gives the annual percentage changes in occupational employment for selected subperiods. To compare rates of increase in employment for occupations between the subperiods 1950 to 1962 and 1900 to 1950 can be misleading, due to the differences between these subperiods in rates of increase for the total labor force. When changes in the industrial structure were analyzed it was found that a better way to compare structural changes in two time periods was to connect class employment with proportions of total employment held by each class and then take annual compound rates of change in the proportions. Table III-H provides these rates of change in proportions. Chart III-D gives the comparison of the period 1900 to 1950 and 1950 to 1962 for rates of change in employment by occupational classes and Chart III-E presents a comparison of the annual compound

Table III-H

Occupational Trends: 1900 to 1962

| | | Average Annual Percentage Change in | | | |
| | | Numbers Employed | | Employment Distribution | |
		1962/1950	1950/1900	1962/1950	1950/1900
A	Total	1.1	1.4	---	---
	White Collar (exc. farm) Total	2.4	2.9	1.3	1.5
B	Professional, Technical and Kindred	4.9	2.9	3.8	1.4
C	Managers, Officials and Proprietors	1.2	2.3	0.2	0.8
D	Clerical	2.4	4.3	1.3	2.9
E	Sales	1.0	2.3	-0.1	0.9
	Blue Collar and Farm Total	-0.5	0.8	-1.5	-0.7
	Blue Collar Total	0.3	1.7	-0.7	0.3
F	Craftsmen, Foremen, and Kindred	1.0	2.0	-0.1	0.6
G	Operatives	-0.1	2.4	-1.1	0.9
H	Laborers (except Farm & Mine)	0.2	0.2	-0.9	-1.3
	Farm Total	-3.5	-0.9	-4.6	-2.3
K	Farmers and Farm Managers	-4.4	-0.5	-5.7	-2.0
L	Farm Laborers and Foremen	-2.2	-1.3	-3.5	-2.8
	Service Total	2.6	1.8	1.4	0.3
I	Private Household	1.6	-0.1	0.5	-1.4
J	Service (except Private Household)	2.7	3.1	1.6	1.6

Source: Appendix C-5.

Chart III-D

Employment Change by Occupation: 1900-50 and 1950-62

(Average Annual Percent)

% change

1950 — 62

% change

1900 — 50

letters indicate occupation.
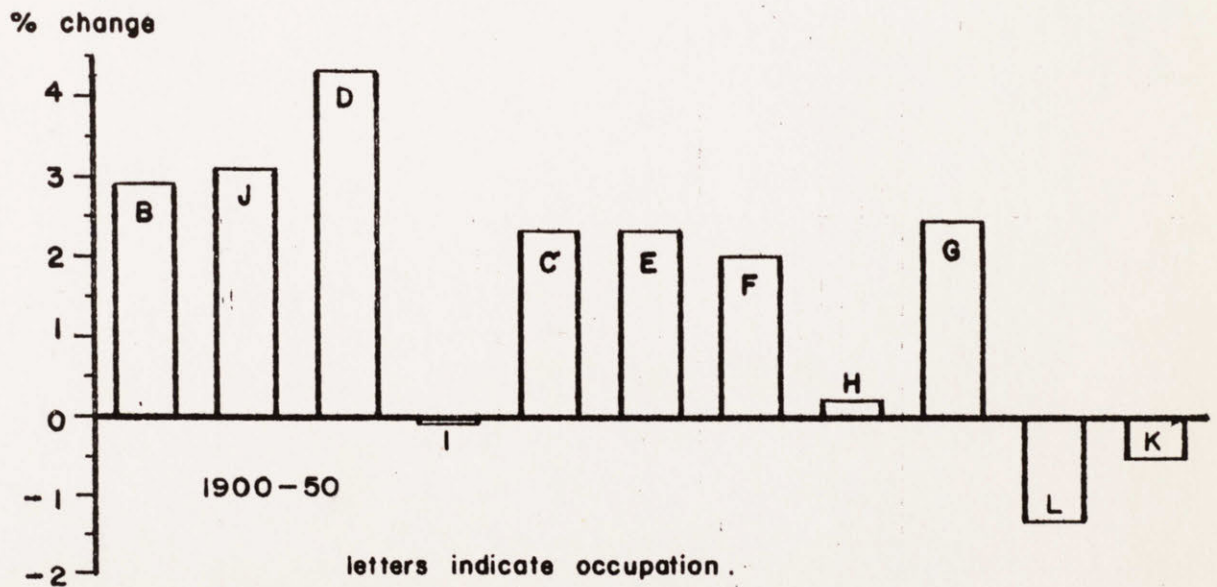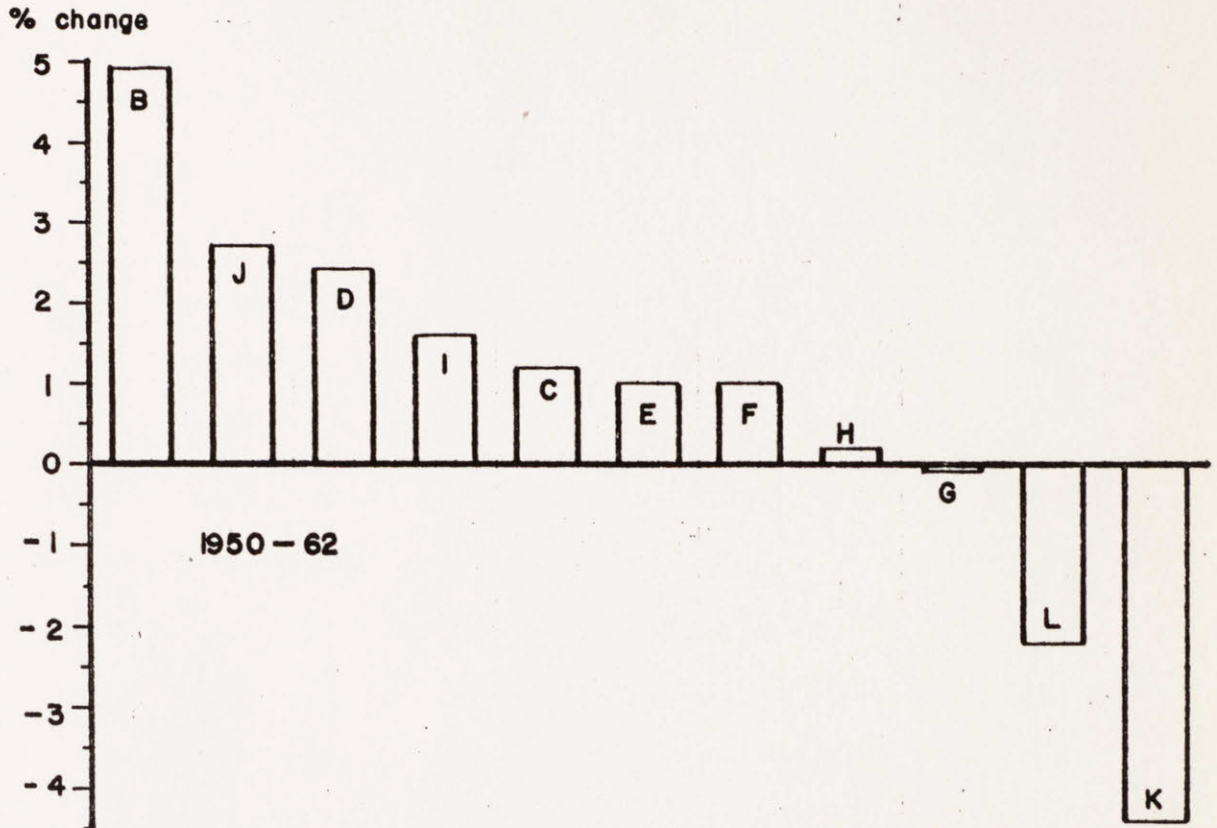
Source: Table III-H.

Chart III-E

Change of Employment Proportions by Occupation:
1900-50 and 1950-62

(Average Annual Percent)
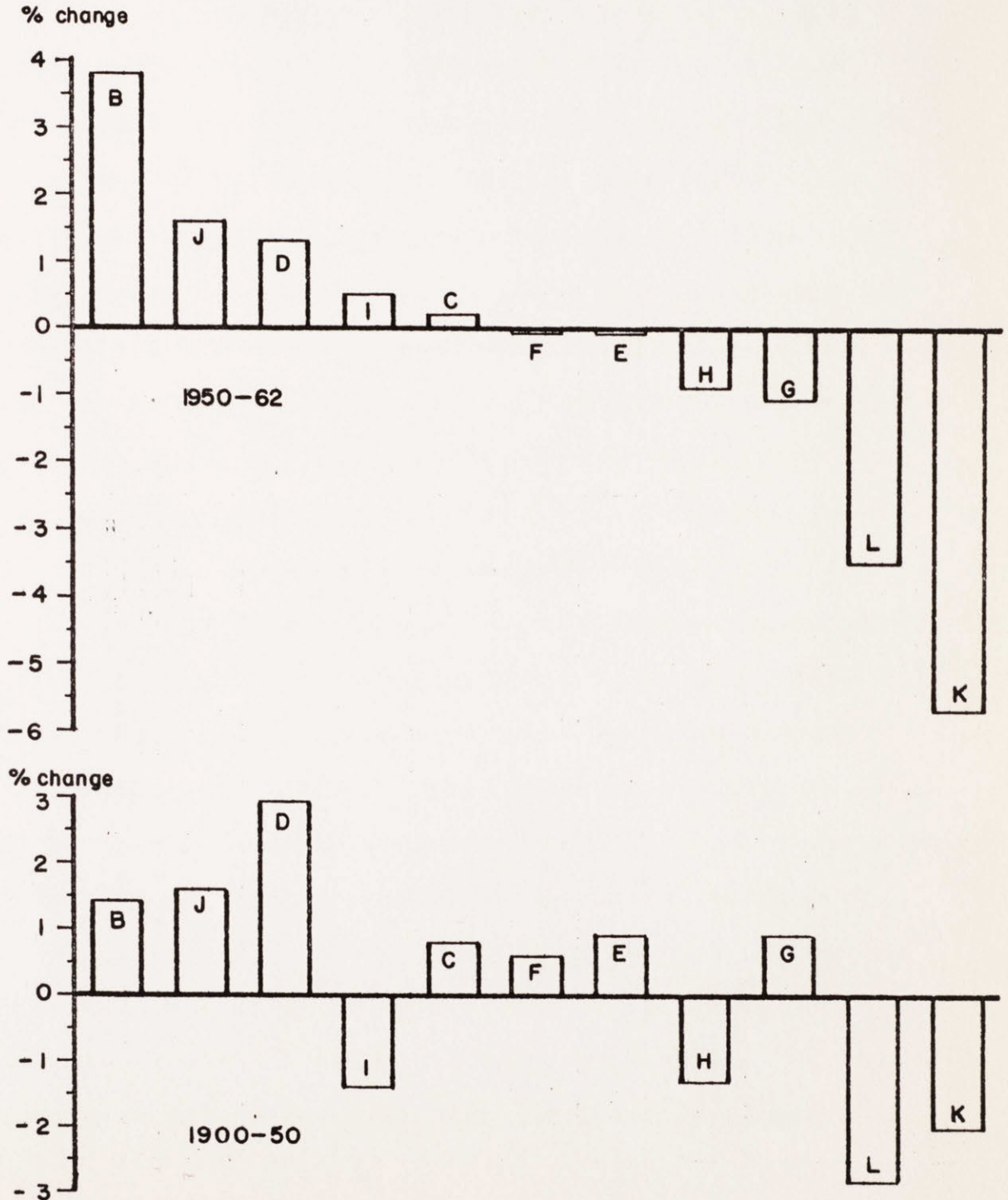
Source: Table III-H.

rate of change in proportions.

It will be discovered that the shift in occupational classes has been much faster during the postwar period. The rate of decrease in the proportion of farmers and farm laborers in the total labor force was approximately twice as fast during the postwar period as it was in the long period 1900 to 1950. In contrast to this low-skilled labor, in the postwar period the professional and technical class increased its proportion in the total labor force at almost three times the rate of the long period 1900-1950. The difference in compositional change between the periods 1950-1962 and 1900-1950 is presented graphically in Chart III-E. In both the long-run period, 1900-1950, and the short run, 1950-1962, there was a trend away from the blue collar and farm employment toward white collar employment. There is a basic difference between the two periods, and this can be seen in the rate of change in absolute numbers employed shown in Chart III-D or Table III-H and in the rate of change in proportions of total employment shown in Chart III-E or Table III-H. This difference is in the <u>rate</u> of change away from blue collar occupations and the <u>consistency</u> of this change. Factory related blue collar occupations actually increased in share of total employment during the long period 1900-1950, because of the rapid increase in the proportion of operatives (G) to total employment. The class of craftsmen and foremen (F) also increased in proportion

during the long period 1900-1950. In contrast, both of these classes lost in proportion to total employment during the postwar period.

It should be noted that there is a consistency in the changes in the industrial and occupational structures. Between 1899 and 1948, the manufacturing industrial sector increased in proportion[1] of total employment. The production worker division of the manufacturing sector also increased in proportion to the total employment during the twentieth century prior to the postwar period.[2] In the postwar period, the proportion of production workers in manufacturing fell from 21 to 18 percent,[3] and the group of manufacturing re-lated blue collar occupations decreased in proportion from 39 percent of total employment in 1950 to 36 percent in 1962.[4]

The research findings presented in Chapters II and III would be a useful base in further research into the nature of the relationship between productivity changes and occupational

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[1]Table III-A.

[2]A production worker estimate for 1899 was not avail-able. This statement rests on the assumption that the re-lationship between production workers and total manufacturing employment that existed in 1909 was also valid for 1899.

[3]Appendix C-2.

[4]Table III-H.

shifts at a finer level of analysis. The measurement of productivity changes by occupational group would be an interesting project, but the level of analysis would have to be considerably finer than the level used in this thesis. An example of speculation that is possible from the start that has been made in the development of the productivity-employment change relationship may be useful. The period of the 1920's was one of very great productivity increase in manufacturing.[1] During the 1920's, however, there was an increase in the number of sales workers of 4 percent a year,[2] and the rate of increase in aggregate productivity for the whole private economy was not as fast as in the postwar period.[3] Thus the fact that the manufacturing sector did not require an increase in employment was compensated for in part by increases in employment in sectors where productivity increases were very modest compared with those of the postwar period. The diffused nature of productivity increases in the postwar economy is illustrated by the ex-ample of difference in employment increases in the retail sales force in the 1920's as compared with the postwar period. The postwar performance was such that sales employ-

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[1]See Higher Unemployment Rates, 1957-60: . . . , op. cit., pp. 25-28.

[2]Appendix C-5.

[3]See Chapter II.

ment increased at only one-quarter the rate in the 1920's.

A look behind these figures is useful. The Census of

Population indicates that between 1950 and 1960 the employ-

ment of retail sales clerks increased from 2,422,000 in

1950[1] to 2,602,000 in 1960, or an increase of less than 0.7

percent a year.[2] During this period retail sales increased

from $156.5 billion in 1951 to $219.5 billion in 1960, an

increase of 40 percent or almost 4 percent a year.[3]

Conclusion

This chapter continued the effort, begun in Chapter II,

to examine the changes in the industrial structure of the

labor force. The interest centered on the direction and

the rate of change in the industrial and occupational

structures that occurred during the postwar period as com-

pared with the long period 1900 to the beginning of the post-

war period. In addition, the relationship between the in-

dustrial and occupational structures was of interest, because

it was through this link that it was possible to observe the

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[1] United States Census of Population, 1950, op. cit.,
Table 2, p. 1c-53.

[2] United States Census of Population, 1960, op. cit.,
Table 2, p. 99.

[3] Statistical Abstract of the United States, 1963, U.S.
Department of Commerce, Bureau of the Census (Washington, D.C.:
Government Printing Office, 1963), p. 822. Prices increased
as well which would tend to lower the magnitude of the real
product handled and therefore reduce the productivity of the

impact on the occupational structure of the productivity

changes in the industrial sectors analyzed in Chapter II.

In the first section of this chapter it was found

that the industrial structure evolved more rapidly during

the period 1948-62 than it did between 1899 and 1948 in the

direction of the non-goods sectors. In addition to the

greater speed of evolution, the postwar experience was more

consistent. The manufacturing sector gained in proportion

during the earlier period, but all goods sectors except

construction lost in proportion during the period 1948-62.

The speed of change is affected by the state of the business

cycle, as goods sectors tend to be more adversely affected

by cyclical declines in business activity than the non-goods

sectors. It was therefore warned that the speed of change

findings could not be extrapolated. What could be learned

from the experience between 1948 and 1962 was the degree

of adjustment that had to be made in the labor market to re-

flect the rate of change in the industrial structure.

The second section of this chapter examined the relation-

ship between the industrial and occupational structures,

and it was seen that they are associated because the goods

industrial sector has a higher proportion of blue collar

---

retail clerks. The variety of goods, however, increased and
this would tend to raise the services provided by stores per
dollar of sales volume and therefore increase the produc-
tivity if the measurement included social welfare.

than does the non-goods industrial sector. The more rapid

and consistent evolution in the industrial structure there-

fore contributed to the shift in the occupational structure

away from blue collar employment. The other cause of the

shift from blue to white collar employment that was analyzed

was the shift within the goods and non-goods sectors toward

white collar occupations. This was measured by relating

the rate of increase between 1948-62 in the goods and non-

goods sectors to the rate of increase in blue and white col-

lar employment in each of industrial divisions. In both

cases it was observed that blue collar employment grew

more slowly than the rate of growth in employment in the goods

and non-goods sectors. In contrast, white collar employment

grew at a faster rate than the goods and non-goods sectors

and therefore increased in proportion of total employment

in each sector. Both causes of the shift in the occupational

structure resulted in an increase in the proportion of

white collar employment to total employment.

The third section of this chapter examined the rate and

direction of trends in the occupational structure during the

period 1950 to 1962 as compared with the longer period, 1900-

1950. It was found that the shift in the occupational

structure was more rapid in the postwar period than in the

long period ending in 1950. The consistency of change was

also very apparent. The blue collar occupations associated

with factory production employment actually increased in pro-

portion to total employment between 1900 and 1950. During
the period 1950-62, the only occupations that increased in
proportion to total employment that could be considered to
be at all blue collar in nature were the service classes
(I and J). The main weight of the more rapid shifts in the
occupational structure was toward the white collar occu-
pations. The importance of this shift to the adjustment pro-
cess in the labor force will be analyzed in the following
chapter.

CHAPTER IV

THE ASSOCIATION OF EDUCATIONAL ATTAINMENT WITH EMPLOY-

MENT, UNEMPLOYMENT AND PARTICIPATION IN THE

LABOR FORCE

> I would like to suggest that, in the long run, we
> will approach the employment problem more effec-
> tively, the actual employment goal more effectively,
> if we attend to the basic problem of the relation-
> ship of education to employment.[1]

If one were to plot the number of books, articles and

speeches that relate education and employment against time

in the postwar period, it is probable that an exponential

function of high power could be calculated to fit a trend

to the curve. This chapter will attempt to quantify the

relationship between education and employment, unemployment,

and labor force participation in order to determine if there

is statistical validity supporting the exponential curve of

interest in the relationship.

It was demonstrated in Chapter III that the structure

of employment evolved toward the white collar occupations

at a faster rate in the postwar period than in the long run

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[1]Statement of Secretary of Labor Wirtz published in the
"Proceedings of a Symposium on Employment," sponsored by
the American Bankers Association on February 24, 1964, p.
17.

period 1900-1950. The findings of Chapter IV may be related to Chapter III, because a faster rate of change in structure raises the question of whether the labor supply has adjusted adequately to the new employment structure.

This question of the labor supply adjustment to the changed configuration of the demand for labor has created a very substantial debate among economists and others who have been concerned about the unsatisfactory level of unemployment in the United States since 1957. The relationship between educational attainment and the shift in the occupational structure is analyzed in the first part of this chapter. Then the effect on labor force participation and unemployment levels is analyzed.

The findings in the first section indicate that occupations that have required higher levels of educational attainment have been growing the most rapidly during the postwar period. Given this finding, which relates to the analysis of the preceding chapters that described the relative speed, direction, and causes of the shift in the occupational structure during the postwar economy, the analysis in this chapter then examines the impact on the adjustment process of supply and demand for members of the labor force by educational attainment. It is suggested that the best measure for testing the adjustment process of the supply of labor with the changed employment structure is through an examination of unemployment and labor force participation rates by classes of educational attainment. The findings in

this section indicate the members of the population with low
levels of educational attainment have experienced an in-
crease in structural disadvantage during the postwar period.
For periods of roughly equal economic activity as measured
by the total rate of unemployment, it will be demonstrated
that members of the population with low levels of education
had a decrease in labor force participation rates relative
to members of the population with higher levels of education.
It will also be shown that members of the labor force with
low levels of educational attainment experienced increases
in their unemployment rates relative to members of the labor
force with higher levels of educational attainment between
periods close to the beginning and end of the postwar
period with approximately equal levels of economic activity
as measured by the total rate of unemployment.

The third section of this chapter will relate these
findings to the debate over whether there has been a
worsening of structural problems in the labor force. It
will be found that a negative answer to this question may
be reached if the proportion of the total number of the un-
employed that are structurally disadvantaged is of interest.
The question can be answered in the affirmative if the rela-
tive difficulty of members of the population who are struc-
turally disadvantaged is of interest. The debate over
whether structural unemployment has worsened will be largely
resolved in this chapter through the proper specification of

the issues that have been of interest.

Educational Attainment and Changes in Employment

This section is addressed to the popular belief that it
has been those jobs that require higher levels of education
that have been growing more rapidly during the postwar
economy. Can this popular opinion that has been accepted
by such people as Secretary of Labor Wirtz[1] be tested
through quantitative measures? If it is assumed that dif-
ferences in the median levels of educational attainment by
occupational class are an approximate measure of the rela-
tive importance of educational attainment in the occupa-
tional classes, then it is possible to relate the change in
employment in the occupational classes during the postwar
period with the median level of educational attainment in
each occupational class. The fact that the occupational
classes that have experienced the fastest growth in employ-
ment between 1948 and 1962 have tended to be the occupation-
al classes with the higher levels of educational attainment
can be seen from Chart IV-A and Table IV-A. The rank cor-
relation of the changes in occupational employment with the
median educational attainment in the classes was 0.64, sig-
nificant at the 5 percent level. The shift from predominately

[1]Wirtz, loc. cit..

Table IV-A

Employment by Occupational Class and Median Education: 1948, 1952 and 1962

Population 14 Years and Over

Occupation	Number Employed			% Δ Employment		Median Education[1]	
	1948	1952	1962	1962/1948	1962/1952	Oct. 1952	March 1962
A Total	59,307	60,989	67,846	14.4	11.2	10.9	12.1
B Professional, Technical and Kindred	3,977	5,092	8,040	102.2	57.9	16+	16.2
C Managers, Officials, and Proprietors	6,344	6,182	7,408	16.8	19.8	12.2	12.5
D Clerical and Kindred	7,438	8,122	10,107	35.9	24.4	12.5	12.5
E Sales Workers	3,641	3,674	4,346	19.4	18.3	12.3	12.5
F Craftsmen, Foremen, and Kindred	8,119	8,743	8,678	6.9	-0.7	10.1	11.2
G Operatives and Kindred	12,396	12,352	12,041	-2.9	-2.5	9.1	10.1
H Laborers (except Farm and Mine)	3,473	3,707	3,559	2.5	-4.0	8.3	8.9
I Private Household	1,754	1,805	2,341	33.5	29.7	8.1	8.7
J Service (except Private Household)	4,286	4,683	6,461	50.7	38.0	9.2	10.8
K Farmers and Farm Managers	4,668	3,963	2,595	-44.4	-34.5	8.5	8.8
L Farmer Laborers and Foremen	3,213	2,669	2,271	-29.3	-14.9	7.5	8.5

[1]Educational attainment for employed persons 18 years of age or older. October 1948 did not include employees 65 years or older.

Source: Educational Attainment: *Manpower Report of the President, 1963*, *op. cit.*, p. 158, Table B-14.
Occupational Employment: *Ibid*., p. 143, Table A-7.

blue collar industries and from blue collar jobs to white

collar jobs within the industrial sectors thus appears to

have created a movement toward those occupations which re-

quire more education.

The magnitude of labor input in an economy may be

measured by persons employed, as in Chart IV-A, or through

hours of input. If one is interested in relating changes

in the economic activity that may be associated with edu-

cational attainment, then it is necessary to adjust the

changes in employment in the occupations by the proportion

of part-time employment in order to get a measure of change

in full-time equivalent employees related to educational at-

tainment. This adjustment from employment to full-time

equivalent employment is particularly necessary for the

postwar period because of the significant increase in part-

time employment, which can be seen in Table IV-B.

When hours of input by occupational class is converted

into employees working the national average of hours per

week, and this adjusted employment[1] is correlated with edu-

cational attainment, a coefficient of rank correlation results

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[1]This attempt to get a production function by hours
worked in occupational classes for the economy would have been
useful in Chapter III. If hours worked by occupational class
can be found for 1900, a comparison between rates of change
for adjusted employment will be developed.

Employment Change vs. Education by Occupation: 1948-62

Chart IV-A

Chart IV-B
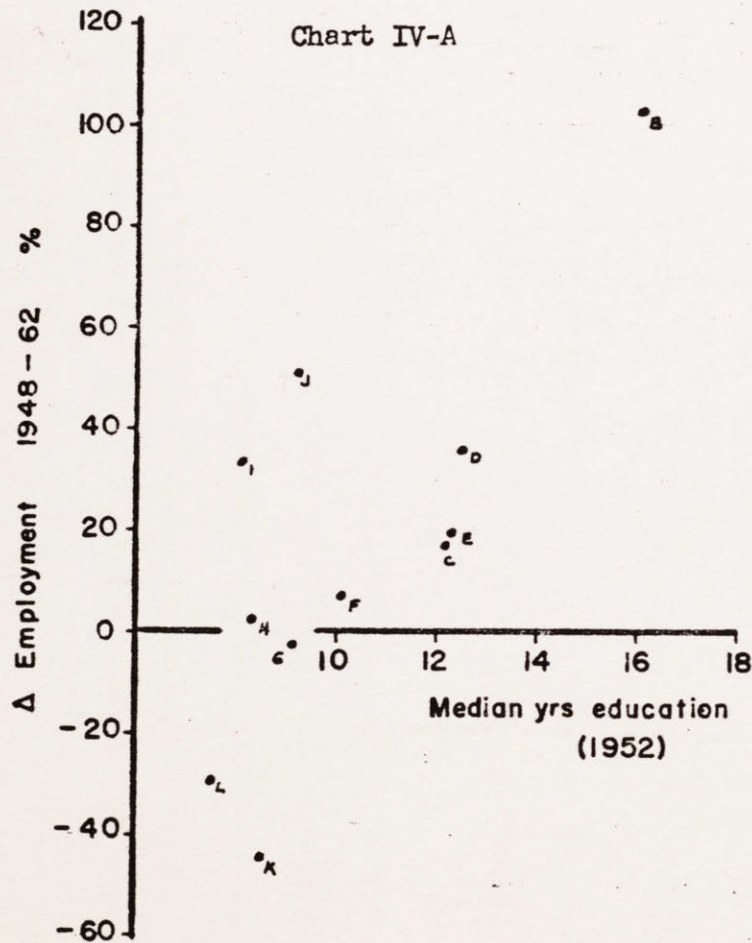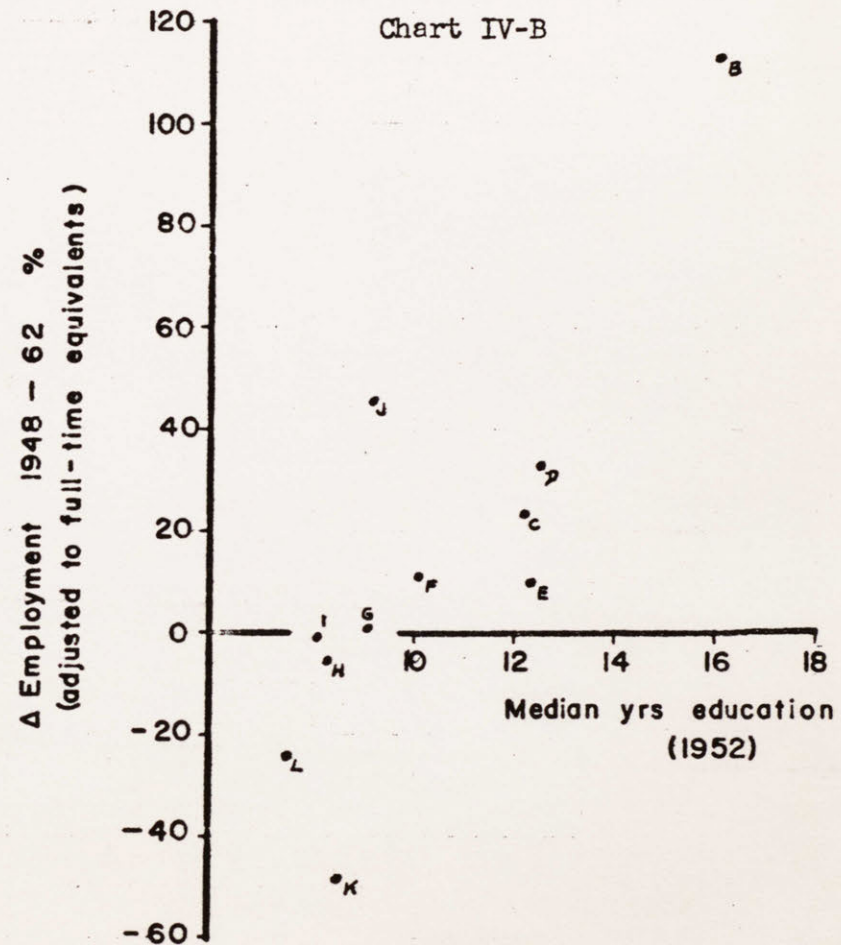
Source: Table IV-A.

Source: Appendix C-11.

105.

Table IV-B

Average Hours Worked and Percent Part-Time by Occupation in March 1950 and August 1962

Occupation	Percent Employed 1-34 hours		Average Hours[1]	
	1950	1962	1950	1962
A All Occupations	12.9	20.6	43.3	40.5
B Professional, Technical and Kindred	14.3	15.5	41.8	41.7
C Managers, Officials and Proprietors (except farm)	4.4	8.3	51.0	49.3
D Clerical and Kindred Workers	7.9	18.5	40.0	37.7
E Sales Workers	15.5	30.2	42.9	37.3
F Craftsmen, Foremen and Kindred	8.2	11.6	41.8	41.6
G Operatives and Kindred	11.8	15.7	41.0	40.6
H Laborers (except farm & mine)	16.1	31.9	39.4	34.9
I Private Household Workers	43.5	65.0	35.2	24.7
J Service Workers	16.0	27.0	42.9	38.7
K Farmers and Farm Managers	12.9	23.5	55.1	51.7
L Farm Laborers and Foremen	30.2	42.2	46.0	39.1

[1]Average of all employed workers in the occupation.

Source: 1962: Employment and Earnings, Vol. 10, No. 3
(September 1963), Table A-20, p. 10; 1950: Calculated
from U.S. Department of Commerce, Bureau of the Census,
U.S. Census of Population 1950, Occupational Characteristics,
Special Report P-E No. 18, Table 14, pp. IB-135 to
IB-146. See appendix C-11.

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of 0.82, significant at the 1 percent level. This is shown

in Chart IV-B.

A study of Table IV-B also suggests an association be-

tween educational attainment and the percentage of part-time

employment in 1962. The fact that those workers with lower

educational attainment were more likely to have part-time

employment is shown in Chart IV-C. The coefficient of rank

correlation is -.71, significant at the 1 percent level. The

higher the level of educational attainment, the lower was the

Charts IV-C and IV-D

Part-Time Employment vs. Education by Occupation: 1962

Chart IV-C

Source: Table IV-B.

Chart IV-D
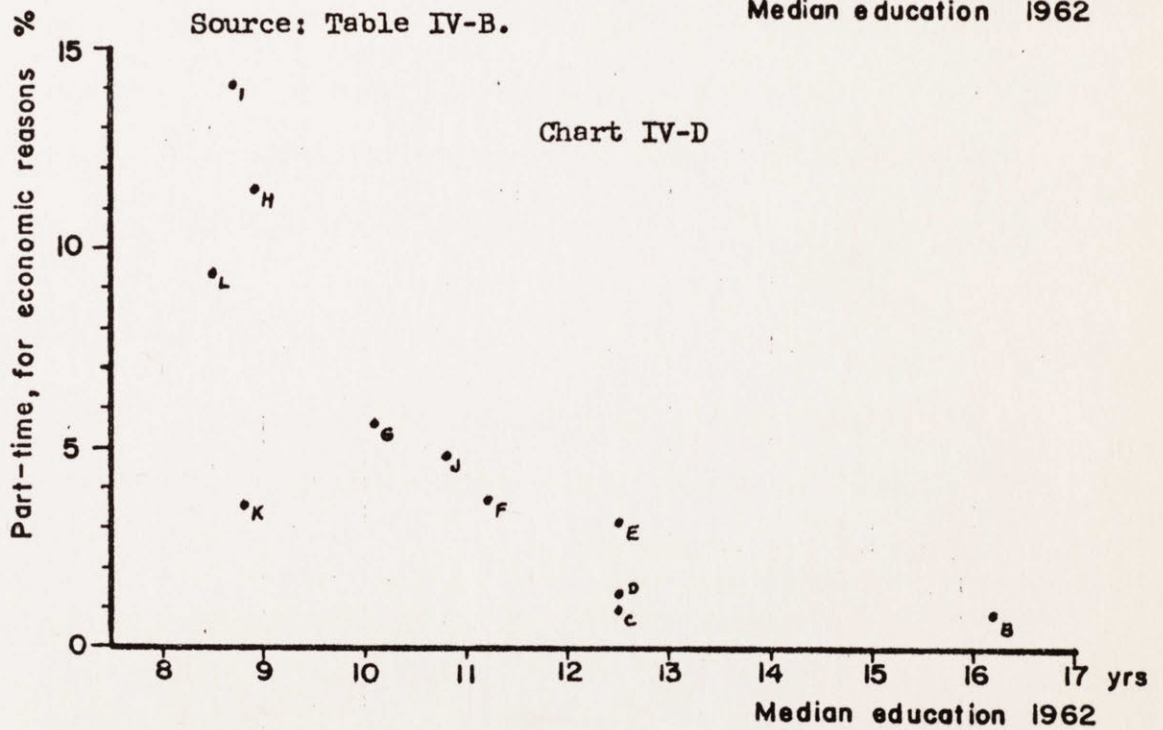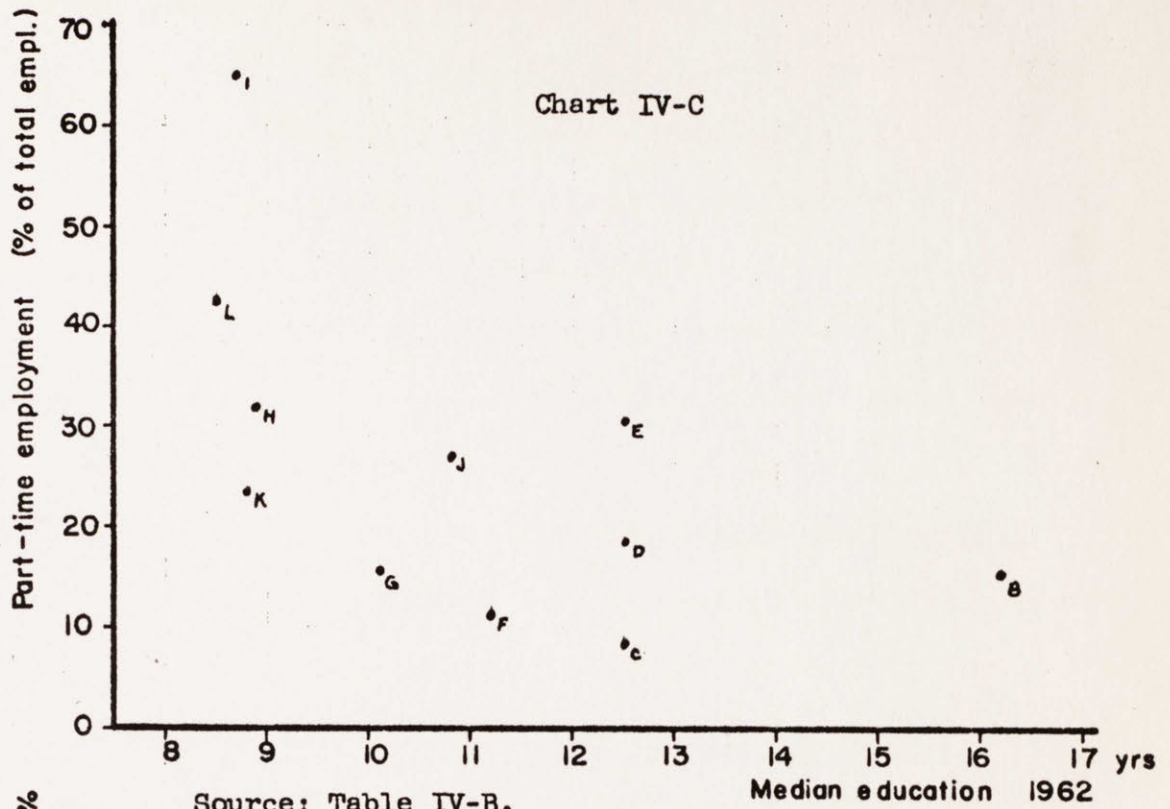
Source: Jane L. Meredith, op. cit. Table D-6, p. A-31, Calculated.

proportion of part-time employment. It would be of interest
to examine the reasons for part-time employment. For ex-
ample, sales workers (point E) have a high proportion of
part-time employment and also have above average educational
attainment. Since much of sales employment is on commission
and the work is relatively unprogrammed, it is probable that
much of the part-time work of sales workers is completely
voluntary. In contrast, it might be expected that laborers
would work full time if there were more regular demand con-
ditions for their services.

If the percentage of part-time employment for economic
reasons in occupational classes is correlated with the median
educational attainment by occupational class, this gives a
rank correlation of -0.85, significant at 1 percent. This
can be seen in Chart IV-D. Several of the causes of part-
time employment for "economic reasons" can be called a re-
sult of lack of demand. They include slack work and the
inability to find full-time work.[1]

Limitations of this Analysis

The association between educational attainment and
employment for the period 1948 to 1962 shown in Charts IV-A

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[1]Jane L. Meredith, "Labor Force and Employment 1960-62,"
Special Labor Force Report No. 31 (Washington, D.C.: Bureau
of Labor Statistics, 1963), p. A-4.

and IV-B may be better understood after the limitations of
the analysis have been enumerated. These limitations stem
primarily from the nature of the available data. Where there
are such data problems, this thesis provides a framework
within which it should be possible to do additional work.
The following areas deserve notice:

(1) <u>The Period of Analysis</u>: The rate of economic
growth in the United States was inadequate for the second
half of the period 1948-62, and a substantial gap grew be-
tween potential and actual GNP. The relationships that were
presented describe what happened during an historical period.
If the growth in GNP had been faster, perhaps there would
not have been such a rapid change in the industrial and oc-
cupational structures. This cyclical limitation was analyzed
in Chapters II and III and affects all phases of this analysis.

(2) <u>Level of Generalization</u>: Major industrial and oc-
cupational classes constitute the level of generalization
used throughout this thesis. Although fine divisions of the
employment structure might be more useful, the utilization
of this level does permit an overview of a very complex
mass of statistics. Robert Solow, after a careful analysis
of the findings of other economists who have worked at this
level of generalization, indicated his belief that conclu-
sions could be drawn from broad classes of data.

It must be admitted that these figures are open to the same cirticism as Kalachek's. In the first place the industrial and occupational groupings may be too broad to offer a useful test of the hypothesis of increasing structural unemployment. Against this I can only reply (a) that our statistics simply do not permit any finer detail and (b) that the structuralist theory loses a good deal of its interest if it can only apply to very narrowly-defined groups in the labor force. If it were clearly the case, as it may well be, that employment opportunities were disappearing for elderly unskilled manual workers in shipbuilding in New England and that the people concerned had neither the geographical, the industrial, nor the occupational mobility to find other employment, then I would be the first to argue that this presents a social and economic problem that a rich society ought to remedy and/ or relieve without delay. But it would not constitute an argument that the high general level of unemployment could not be reduced by demand expansion--unless it is only one of many similar problems. But in that case it should show up even in such coarse statistics as we have--and it does not.[1]

This comment on level of generalization may be concluded with the reflection that the broad level of generalization is the proper level, in this case, at which to begin an analysis. It would not be desirable, however, to end a study at this level, if resources and statistics are available for a more detailed analysis.

(3) <u>Measurement of Educational Attainment</u>:[2] A third limitation of this analysis comes from the measurement of

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[1]"The Nature and Sources of Unemployment in the United States," The 1964 Wicksell Lectures distributed by Almqvst and Wiksell, Stockholm, p. 42.

[2]Appendix A to this chapter presents an analysis in greater depth of this limitation.

educational attainment. It can easily be understood that
years of educational attainment is a very imperfect measure
of actual achievement in education. The measure, years of
attainment, varies in what it measures by such variables as:
(1) when the schooling was attained; (2) geographical
area where schooling was given; (3) quality of individual
schools; (4) race or background of parents; and (5) dif-
ferences in individual capacities that are randomly dis-
tributed. It will suffice for the purposes of this analysis
to state that this concept may be used as an ordinal measure
of years of achievement for each educational class. That
is, in any class of educational attainment, there will be an
overlap of achievement into adjoining classes. For example,
for the educational class 12 years, it is probable that
achievement ranges from 5 or fewer years to 16+ years. How-
ever, the median value of this class would be higher than
the median value of the class of educational attainment be-
low it (i.e., 9-11 years) and it would be lower than the
median value of the educational class above it (i.e., 13-
15 years).

The division of the labor force into educational classes
may not have precise cardinal value, but this is not neces-
sary if the central tendencies of the classes have an ordinal
relationship. In the remainder of this chapter, it will be
demonstrated that other attributes of labor market activity
(i.e., income level, rate of unemployment and rate of labor
force participation) follow a consistent ordinal pattern that

relates to educational attainment.

(4) <u>The Redundancy of Education for Employment</u>: A
fourth limitation involved with the use of median educational
attainment statistics in the study of employment is the pos-
sibility that much education in the United States is redun-
dant. Those who advocate this position charge that the
nature of work has not changed and that employers now demand
more education than jobs require. For example:

> The dropout problem was not created by the
> inability of non-graduates to perform the more
> or less menial tasks in society. The problem
> exists because employers will not hire dropouts
> even for low-grade service jobs if they can pos-
> sibly avoid doing so.[1]

Gardner Ackley has linked the possibility of educational
redundancy to the level of demand.

> The fact, for instance, that large numbers
> of teen-agers with only high school educations
> or less are now unemployed does not necessarily
> mean that their level of skill and education is
> now completely obsolete in a new world of auto-
> mation. It mainly reflects the fact that an
> employer who has a choice between hiring an un-
> employed worker with experience or a teen-ager
> just out of school is usually going to hire the
> former. The fact that, after a few weeks or
> months of on-the-job training and experience,
> the youngster will also be a productive and use-
> ful worker will begin to interest him as the
> supply of unemployed workers with previous ex-
> perience begins to dry up.
> When employers have in the past been faced
> with strong markets for their products they

---

[1]Ely M. Brandes, "Manpower Planning and The New Pariahs,"
<u>The Reporter</u>, March 26, 1964, p. 17.

have always found ways to upgrade the workers
already on their payrolls--all along the
spectrum of skills--and to feed in unskilled
workers at the bottom. And when demand
slackens they in part reverse the process.[1]

It should be recognized that the term "educational at-
tainment" is associated with many variables other than
preparation for employment. Nonwhites tend to have lower
educational attainment. Members of the population from
poverty families tend to have lower educational attainment.
Members of the population who are unsocialized and very
neurotic tend to have less educational attainment. Sickly
people may tend to have low levels of attainment. In short,
"educational attainment" is an end product of many variables.
In an impersonal and imperfect world, arbitrary standards
of acceptability are often utilized. If the educational
standards of employers have changed over time due to the
greater availability of members of the labor force with in-
creased educational attainment, this change may be a per-
fectly rational use of educational attainment to filter
out applicants who have not been able to demonstrate that
they can pass minimal tasts that represent intelligence,
determination, stability, and the need for achievement. Is
there any difference in an employer stating "high school
graduates only" and the practice of Dr. Ackley's profession
that requires a Ph.D. for acceptability? In both cases, it

[1] "Our National Economy: Present Situation and Outlook,"
address by Gardner Ackley before the Vermont-New Hampshire
School of Banking, Hanover, New Hampshire, September 8, 1963,
pp. 9-10.

is probable that median educational attainment is _often_ greater than median educational requirements.

Income levels related to education and occupations are a source of information that provides perspective on limitations three and four. Table IV-C gives occupational earnings by level of education. In 49 out of 50 possible classes, higher median earnings were received in the educational class immediately above the preceding lower level of educational attainment.[1]

A review of Table IV-D demonstrates that employers appear willing to pay more for increased education. Herman Miller has analyzed this willingness even for so-called low-skilled jobs:

> Everyone knows that it pays to go to college. But does schooling pay off if you are only going to be a carpenter, a plumber, or a bus driver? Definitely. The figures in [Table IV-D] below show the earnings of two groups of white males in their prime years. Nonwhites and men in other age groups are omitted in order to focus on one thing only--the effect of education on earnings. One group never went beyond the eighth grade and the other group finished high school. The figures show that in many occupations the high school diploma is worth about $1,000 a year--roughly $40,000 over a working lifetime.
>
> Why the difference? There are many reasons. High school graduates have higher IQ's. This is partly due to their greater education. It may also reflect greater native intelligence and aptitude to learn.[2]

---

[1] The one exception is class (H), Laborers (except farm and mining). Here high school graduates have higher median earnings than those with some college education.

[2] Herman P. Miller, _Rich Man, Poor Man_ (New York: Thomas Y. Crowell Company, 1964), p. 144.

Table IV-C

Male Median Earnings by Occupation and Education: 1959

25 through 64 years
(Experienced Civilian Labor Force Only)

Years of School Completed	All occupations	Professional technical and kindred workers	Managers, officials, and proprietors except farm	Clerical and kindred workers	Sales workers	Craftsmen foremen and kindred workers	Operatives, and kindred workers	Laborers except farm and mine	Service workers, including private household	Farmers and farm managers	Farm laborers and foremen
Total	$5,083	$6,978	$6,855	$5,216	$5,747	$5,444	$4,645	$3,504	$3,799	$2,447	$1,577
Elementary:											
0 to 7 years	3,400	4,605	4,477	4,340	3,631	4,385	3,803	2,830	2,941	1,441	1,204
8 years	4,474	5,443	5,525	4,824	4,580	5,157	4,612	3,760	3,624	2,414	1,986
High School:											
1 to 3 years	5,038	6,102	6,089	5,102	5,214	5,530	4,900	3,977	4,016	2,748	2,287
4 years	5,541	6,481	6,750	5,311	5,766	5,903	5,198	4,335	4,618	3,230	2,772
College:											
1 to 3 years	6,119	6,677	7,826	5,376	6,433	6,139	5,227	4,220	4,664	3,832	3,242
4 years or more	7,664	7,702	9,486	5,861	7,423	7,565	5,373	4,314	4,795	4,426	4,181

Note: The median earnings most closely approximating the median earnings for the total occupational class are underlined.

Source: Manpower Report of the President, 1964, op. cit., Table G-11, p. 266.

Table IV-D

Education, Occupation and Income: 1959

Occupation	Elementary School Graduates	High School Graduates	Difference
Bricklayer	$5,100	$6,300	$1,200
Carpenter	4,800	5,700	900
Electrician	6,100	6,600	500
Mechanic	5,000	5,900	900
Painter	4,400	5,100	700
Plumber	5,700	6,700	1,000
Toolmaker	6,700	7,300	600
Bus Driver	4,400	5,400	1,000
Truck Driver	5,200	5,700	500
Fireman	5,300	6,000	700

Source: Miller, op. cit., Table VIII-2, p. 145. Miller uses average earnings of white men aged 35 to 40--taken from U.S. Census of Population: 1960, Vol. II, Part 7B, "Occupation by Earnings and Education."

Edward F. Denison has linked differences in income to differences in labor productivity.

> Reliance, for broad groups, on the marginal productivity explanation of the distribution of income permits us to treat differentials in the average contribution to production made by the individuals comprising them.[1]

Denison gives education credit for only three-fifths of the reported income differential and attributes the rest of the differential to such attributes as the natural ability and energy which must have been present to attain the above-average level of education.[2]

[1] The Sources of Economic Growth in the United States, Committee for Economic Growth, Supplementary Paper (New York, 1962), p. 68. See chapter 7, pp. 67-79 for his complete analysis of the returns to education.

[2] Ibid., p. 67.

Employers could still be irrational in their hiring
practices if the difference in marginal productivity
associated with the difference in educational attainment
were smaller than the difference in the wage structure be-
tween educational classes. George H. Hildebrand has con-
sidered that the low-skilled workers may be overvalued rela-
tive to higher-skilled workers.[1] He cites the Bureau of
Labor Statistics[2] data indicating that, during 1953-63,
"median average increases in gross hourly earnings of male
unskilled plant workers and of males in skilled maintenance
trades in manufacturing in 17 metropolitan areas rose iden-
tically at 4.2 percent per year."[3] He also observed that
"Between 1947 and September, 1961, the minimum wage advanced
from $ 0.40 to $ 1.25 per hour, or by 213 percent, while
average hourly earnings rose from $ 1.217 to $ 2.32, or by
96.4 percent."[4]

There are additional measures of wages that might be
considered to obtain a more accurate picture of wage dif-
ferentials (e.g. the coverage of the $ 1.25 minimum, changes
in weighting between high and low wage plants, the effect
of the increased level of social security taxes). It will

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[1] George H. Hildebrand, "Some Alternative Views of the
Current Unemployment Problem in the United States," Unpub-
lished monograph, 1964, pp. 20-27.

[2] U.S. Department of Labor, Bureau of Labor Statistics,
Bulletin No. 1345-83, Wages and Related Benefits, Part II
(Washington, D.C.: June, 1964).

[3] Hildebrand, op. cit., p. 21.

[4] Ibid., p. 22. Hildebrand derived this finding from
statistics in: U.S. Department of Labor, Bureau of Employ-
ment Statistics, Bulletin No. 1312-1, Employment and Earnings
Statistics for the United States, 1909-62 (Washington, D.C.:
Government Printing Office, 1963).

suffice for the purposes of this study to apply the findings

of Hildebrand to the question of educational redundancy. If

there were great redundancy, then employers could profitably

hire low-skill, poorly educated workers at rates of pay suf-

ficiently lower than the pay of higher-skilled, better edu-

cated workers who are more productive. Hildebrand concludes

that just the reverse of this possibility is the case.

> As measured by either set of data, there is
> good reason to believe that the differential for
> workers of average or of top skill relative to
> the price of unskilled is now too narrow. In the
> first place, there is every reason to doubt that
> the productivity of low quality labor has risen as
> fast as the average or that for highly skilled
> groups. Yet the price of the services of the
> first group has been rising as fast if not
> faster than for the others, in relative terms.[1]

Professor Hildebrand has raised the interesting relation-

ship of productivity per unit of labor cost for personnel

with varying degrees of ability. It will be useful to

contrast his findings with an opinion of James W. Knowles on

a related question.

> There are too many managers hiring highly
> priced, highly skilled workers, for jobs that
> less highly priced, less highly skilled
> workers could do, instead of performing the
> more difficult task of matching jobs with
> available workers. I speak from experience
> in this matter, not theory.[2]

---

[1] Hildebrand, op. cit., p. 23.

[2] James W. Knowles, "The Path to 1970," The Conference
Board Record (November 1964), p. 57.

Dr. Knowles has found that workers with lower skills can
do the work that is often done by workers with higher
skills.[1] Professor Hildebrand would agree with the finding
of Dr. Knowles as far as the fact that higher priced,
highly skilled workers often perform the work that could be
done by less skilled, lower paid workers. Professor Hilde-
brand brings in the important variable of relative produc-
tivity. No one should question the contention of Dr.
Knowles that lower skilled workers can often do the work
done by workers with higher skills. Employers would still
be rational if they hired the higher skilled, higher paid
workers if the productivity differential was greater than
the remuneration differential. The conclusion of
Professor Hildebrand is that employers obtain lower unit
labor costs by hiring more expensive laborers given the
relative factor prices in this case. Professor Hildebrand's
conclusions deserve further analysis, but it is relevant to
observe that the question of relative <u>costs</u> is not usually
incorporated into the analyses of economists, who argue,
as Gardner Ackley and James Knowles did, that workers with
lower skill attainment can do the work. There is not
enough known about relative productivity per dollar of
wages for workers of varying educational attainment and skill

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[1]Dr. Knowles did not expand upon his experience in this
matter, and it will therefore be necessary to interpret his
opinion without adequate evidence.

level to be more precise about the issue and the problem of possible educational redundancy. To the extent that the wages of those with low skills have risen faster than their productivity, as Professor Hildebrand has found, then more research is warranted on the significance of these trends on the ability of workers with low skills to obtain employment. How to increase the productivity of low skilled personnel is a question that also follows from these tentative findings by Professor Hildebrand. Professor Machlup summarized the relationship between the changing employment opportunities, wages, productivity and the public policy implications as follows:

> If employment opportunities continue to improve for high-level-knowledge-producing labor and to worsen for unskilled manual labor, the danger of increasing unemployment among the latter becomes more serious. To speak of absolute unemployability of people of low intelligence and little training may be going too far, because employability is partly a matter of the price at which labor is offered. But since society no longer tolerates "cheap" labor, and unskilled physical labor may find uses only if it is cheap, the combination of our social ideas with the continuing technological and economic trends may in fact spell unemployability for certain low-level types of labor. At socially acceptable wage rates, workers of very low economic productivity may remain permanently unemployed; and this unemployment is apt to persist even in the face of attempts to create "effective demand" if wage rates are promptly adjusted to inflated price levels.

The implications, then, of the trends observed
with regard to the occupational composition of
the employed laborforce are rather dismal.
They seem to leave us with an unpleasant choice:
either to resign ourselves to larger wage dif-
ferentials, increasing spreads between minimum and
average earnings, or to face a continuing upward
creep of the rate of unemployment, not only in
bad times but also in prosperity. Perhaps this
dilemma can be avoided by a third possibility,
namely, through a drastic improvement of school
programs that raises the lazy and unambitious
to higher levels of accomplishment. But even if
this is a possibility, it can be realized only
years after the school reform, a reform which
probably is not much less unpopular than low
wages or unemployment.[1]

The link between wages and productivity differentials sug-

gested by Professors Hildebrand and Machlup deserve further

attention and should be included in analyses that refer to

the possible redundancy of education or skill.

The relationship between increases in employment and

educational attainment by occupation shown in Charts IV-A

and IV-B appears to have meaning despite the limitations

discussed. Employers pay more money for workers with bet-

ter education. Why should employers be more willing to

hire the better educated at higher wages in some occupa-

tional classes than in others, as it was discovered in

Table IV-C? Either there are varying degrees of irration-

ality among employers in the different occupational classes,

or education is more useful in some occupations than in

others. This last proposition is the one accepted here,

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[1]Fritz Machlup, The Production and Distribution of Know-
ledge in the United States (Princeton, N.J.: Princeton Uni-
versity Press, 1962), pp. 397-398.

because it is supported by the fact that employers are willing to pay a substantial premium for the increased education.

Since it was not possible in this thesis to quantify the magnitude of educational redundancy or otherwise evaluate the effect of possible redundancy on the correlations done in Charts IV-A and IV-B that attempted to associate changes in employment with the median educational attainment of the occupational classes, one further precaution was taken. The year 1952 was chosen as the base for median educational attainment of the occupational classes on the assumption that if there were redundancy, it would be minimal at an earlier part of the postwar period. Richard S. Eckaus attempted to calculate educational requirements of the labor force, and he arrived at the conclusion that the average number of school years needed was 10.1 in 1950.[1] This was close to the 10.9 years median education of our base year, 1952. The willingness of employers to pay more for additional educational attainment would appear more likely to be rational in 1952 than in the latter part of the postwar period when there was a labor surplus.

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[1] Richard S. Eckaus, "Education and Economic Growth," in Economics of Higher Education, Selma J. Mushkin (Editor), U.S. Department of Health, Education, and Welfare (Washington, D.C.: Government Printing Office, 1962), p. 121.

Summary

The associations made in Charts IV-A and IV-B led to
the conclusion that those occupational classes that re-
quired a higher median level of educational attainment have
been those occupational classes that have tended to grow
more rapidly during the postwar period. Since the occupa-
tions with low median educational levels have also been the
occupations with higher rates of part-time employment, the
change in the employment structure toward those occupations
with higher median levels of educational attainment becomes
more pronounced when occupational employment is converted
into employees working at the national average of hours per
week.

Four limitations of this analysis were enumerated. It
was not possible to place a precise weight on these limita-
tions. The next section of this chapter will consider the
changes in the rate of unemployment and labor force partici-
pation by educational class. The findings in the next sec-
tion are consistent with what might have been predicted from
the findings of the first part of this chapter, given the
assumption that the limitations did not seriously impair
the conclusions about the associations made between changes
in employment and educational attainment.

Labor Market Adjustment:
Educational Attainment and Levels of Unemployment
and Labor Force Participation

From previous discussion, one might expect a trend toward a faster than average increase in the unemployment rate of the relatively uneducated and a faster than average decrease in the labor force participation rate of this group. However, until an examination has been made of changes in the quality of the labor supply, an attempt cannot be made to draw conclusions from the data examined thus far.

Quality Improvements in the Labor Supply[1]

Increases in the median level of educational attainment constitute the one measure available for an index of the change in the quality of the labor supply. The analysis in the first section of this chapter indicated that this is an imperfect measure. Because social pressure to keep students in school has mounted, the accuracy of the measure is probably worse at the margin than for the average of all employees. Nevertheless, this is the measure which must be used, because there are no better measures available, and by this measure the labor supply has adjusted to the postwar demands

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[1] See Appendix IV-C and Table I-C for additional evidence on quality increases of the labor supply.

in the labor market with great rapidity. The median edu-
cational attainment of all workers 18 years of age or over
increased from 10.6 years in 1948 to 12.1 years in 1962. If
this rate of improvement continues for fourteen more years,
the median educational attainment of all workers will be
raised to 13.5 years.[1]

According to James W Knowles, the increase in the level
of educational attainment of the labor force was one of the
factors which facilitated the adjustment of the labor supply
to the changed structure of employment during the postwar
period.

> The sharp rise in the educational attainment
> of the work force and particularly of young persons,
> has facilitated industrial and occupational shifts.
> An increased level of formal education and rising
> skill requirements have been continuously inter-
> acting factors, with a growing need for more com-
> plex skills encouraging further education, and in-
> creased education fostering the upgrading in
> the skill levels of the labor force. Blue-collar
> workers may exhibit considerable mobility within
> the blue-collar occupations, and between them and
> some of the less skilled white-collar and service
> occupations. The growth in employment in profes-
> sional and technical occupations, however, has been
> possible only because of the rising level of for-
> mal education. This rise has occurred along all
> points of the educational spectrum, with signifi-
> cant increases in the proportion of persons
> finishing grammar school, high school, and college.[2]

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[1] Manpower Report of the President, 1964, op. cit., Table
B-14, p. 220. The 1948 median does not include workers 65
years of age or over.

[2] Higher Unemployment Rates, 1957-60: . . . , op. cit.
p. 70.

Thus, at the same time that the structure of employment
or the demand for labor has shifted toward those occupations
that have tended to require a higher level of educational at-
tainment, the level of educational attainment in the labor
force has been rising rapidly. This information does not,
in itself, provide an answer to the question of what is
likely to happen to the structure of unemployment. The rate
of growth in aggregate demand must be considered. At a low
level of demand, employers will find that better educated
workers are available, and that it may pay to hire the bet-
ter educated at higher rates of pay even though the work
could probably be done in some fashion by workers with lower
educational attainment. It is not to be expected that em-
ployers will train workers if there is an available supply
of better trained or more easily trainable personnel. Much
more information is needed about changes in the productivity/
pay ratio of workers with various skill qualifications.

Levels of Unemployment and Labor Force Participation as
a Test of Labor Market Adjustment

A possible test of the adjustment process in the labor
market is to examine shifts over time during the postwar
period in unemployment and labor force participation rates
by classes of educational attainment. This obvious test
meets with difficulty, because structural unemployment (defined

as deviation of classes from the average or total unemploy-
ment rate) displays a typical pattern that is not necessarily
a function of time, but a function of the business cycle and
the rate of total unemployment. It is therefore necessary
to ask if this typical pattern has become worse during the
postwar period, i.e., for any given level of total unemploy-
ment, was the position of the structurally disadvantaged
worse at the end of the postwar period than at the begin-
ning? Professor Robert M. Solow has suggested the following
test for whether there has been an increase in structural
difficulty:

> To put the structuralist hypothesis to a
> test one must try to find - by direct observation
> or by some kind of statistical adjustment - two
> or more periods of time when the general pressure
> of demand was about the same. If it then turns
> out that in the more recent period the level of
> unemployment was higher, or more strongly concen-
> trated in certain skill categories or industries
> or regions, then the conclusion is that there has
> been an increase in structural unemployment. If
> the general level of unemployment and its inci-
> dence on different groups, or its dispersion among
> the various groups in the labor force, is about
> the same in the two periods, then there is evi-
> dence that the volume of structural unemployment
> has not significantly changed. The difficult
> thing is to know when the general pressure of
> demand is about the same in two separate years.
> About all anyone can do is to exercise some
> statistical ingenuity, and this has been done
> in various ways by the several students of the
> problem whose results I would like to describe.[1]

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[1] Robert M. Solow, op. cit., p. 21.

A Warning on the Use of Unemployment and Labor Force

Participation Rates as a

Test of Structure

Unemployment and labor force participation rates may
be given for many kinds of structure. When an attempt is made
to find a relationship between two variables in an analysis
that is loaded with many variables subject to countless per-
mutations, it is necessary to be careful that combinations
of variables do not lead to a relationship that is not valid
if the combination is disaggregated. In simple notation:

    Given: if A + B, then C

    It is not possible to state: if A, then C

                                 or   if B, then C

For example, if nonwhites tend to make up a large pro-
portion of the educational class 8 years or less of attain-
ment, and if this class has a relatively high unemployment
rate, it is not known whether the high rate of unemployment
for the educational class 8 years or less of education re-
sults from lack of education or from discrimination against
nonwhites. A first step in avoiding such confusion would be
to examine the behavior of white unemployment rates by edu-
cational class. The level of aggregation is another key vari-
able. If participation rates are analyzed for a class of
workers such as white males 14 years of age and over, it may
be found that the rate of labor force participation has de-

creased because of increases in the length of schooling.

Thus a whole large class can be affected by a change in the

behavior of a sector such as the age bracket 14-24 in this

example. It would therefore be wise to attempt an analysis

of white males of prime working ages (such as 35-44 years).

A second pitfall to be avoided is the partial measure-

ment of structural change. It is for this reason that it

has been found necessary in this study to use the rate of

unemployment and the rate of labor force participation.

Both of these measures of inadequate demand for a class of

workers are necessary. It can be a serious mistake to ex-

amine only unemployment rates, for they do not tell the

whole story. The hopelessly unqualified members of a given

group may drop out of the labor force and, consequently, out

of the ranks of the unemployed. An example may clarify the

relationship between unemployment rates and participation

rates. The rate of unemployment is a residue, and it is

subject to the problems of distortion inherent in residue

analysis, i.e., a very small shift in the population creates

a major shift in the residue. Let us assume that at a par-

ticipation rate of 80 percent, 6 percent of a given group

are called unemployed. Now let us assume that some members

of the group considered to be out of the labor force and

therefore not unemployed had dropped out of the labor force

because of lack of demand for persons with their skills. If

two percent of the total group had so dropped out of the

labor force, then returning them to the labor force would in-
crease the unemployment rate from 6 percent to 8 percent,
a 33 percent increase in the rate of unemployment. This would
increase the rate of labor force participation from 80 per-
cent to 82 percent, an increase of only 2.5 percent.[1]

A third difficulty in the use of unemployment rates to
measure structural change is the manner in which they are
defined by occupation and industry. Unemployment is defined
by the last occupation and the last industry within which a
job was held. The longer a person is unemployed, the more
likely it is that he will drop out of the labor force or
shift into another occupation or industry. The increase of
those unemployed 15 weeks or longer from 19.1 percent of
total unemployment in 1957 to 31.9 percent in 1961 and
26.1 in 1963[2] has contributed to the two trends of with-
drawal from the labor force and changed occupation and indus-
trial classification.

The importance that industrial and occupational mo-
bility has on the meaning of unemployment rates by indus-
trial and occupational class can be understood better when
one considers the study, "Job Mobility in 1961," by Gertrude
Bancroft and Stuart Garfinkle.[3] Their findings for job

---

[1]The test of structural change suggested earlier by
Professor Solow is therefore inadequate for some purposes
because it considers only the rate of unemployment. The
problem of the proper test for various objectives of analysis
will be considered later in this chapter.

[2]Manpower Report of the President, 1964, op. cit., p. 203.

[3]Gertrude Bancroft and Stuart Garfinkle, "Job Mobility
in 1961," Special Labor Force Report No. 35 (Washington, D.C.:
Bureau of Labor Statistics, 1963).

changes in three occupational classes are presented in Table IV-E. It is relevant to note that much of the job shifting resulted from workers losing their jobs. For example, in 1961 66 percent of the construction workers and 42 percent of the manufacturing workers[1] who shifted jobs did so because they had lost their job of longest attachment.

Secretary of Labor Wirtz has described these two factors as follows:

> The data on manpower utilization which was presented earlier in this section for Negroes and uneducated older workers suggest that part of the apparent decline in unemployment in contracting industries, occupations, and areas may represent not an improvement in the employment situation but a squeeze-out of workers from the labor force.
> Moreover, a decline in unemployment in one industry or occupation may not reflect an improvement in that sector or a reduction in its displacement tendencies, but rather a shift of unemployment to another sector. The identification of the unemployed according to their occupation and industry is frequently difficult to make in any meaningful way because the figures relate to the last job held by the worker. After a long period of unemployment, a worker laid off from a steel or aircraft plant may take what he feels is an interim job in a gas station or a supermarket. At best this represents a case of underemployment -- a sharp cut in his income and less than optimum utilization of his abilities. At worst, the worker is again laid off but this time shows up as unemployed in retail trade, not manufacturing. It is difficult to know how much of this has occurred, but the employment drop -- without a corresponding rise in unemployment -- in durable goods industries which are significantly below the 1957 job level -- e.g., in transportation equipment, down by 250,000, machinery down by

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[1] Ibid., p. 8.

Table IV-E

Pattern of Job Shift for Males by Occupational Group: 1961

Pattern of Job Shift (% distribution)

Major occupation of job left	Number*	Total	Same Occupation & Industry	Same Industry Different Occupation	Same Occupation Different Industry	Different Occupation & Industry
Craftsmen, foremen and kindred	1,654	100.0	53.1	8.8	14.5	23.6
Operatives and kindred	1,753	100.0	25.3	10.1	25.1	39.5
Laborers, except farm and mine	1,184	100.0	22.3	9.5	19.3	49.0

*In thousands

Source: Ibid., p. 9.

100,000, and steel down by 100,000 suggests that
the transfer of unemployed to other industrial
sectors, rather than improvement in employment,
has been the significant factor in reducing un-
employment in these specific sectors during the
past several years.[1]

Change of occupation and industry can have a powerful
effect on the structural nature of unemployment because a
decline in a disadvantaged class may be added to a more ad-
vantaged class, thereby having a double effect (in contrast
to a drop in labor force participation which merely reduces
the unemployment rate of a disadvantaged class). The magni-
tude of the change in definition effect is difficult to
quantify exactly, but there is a way of tentatively demon-
strating that there is a powerful effect. One would expect
that industrial sectors that were growing rapidly in em-
ployment would have a smaller increase in the rate of unem-
ployment than sectors with small increases or declines in
employment. The rank correlation between increases in em-
ployment and increases in the unemployment rate was, as one
would expect, a negative one (r_{rank} = -0.67) for the period
1947 to 1957.[2] This rank correlation is significant at the
5 percent level. The rank correlation of increases in the
rate of unemployment and changes in the employment of in-
dustrial sectors for the period 1957-62 resulted in a
positive correlation of 0.21, which was not significant.[3]

[1] Manpower Report of the President, 1964, op. cit., pp. 32-33.

[2] Calculated from statistics in appendix C-7.

[3] Calculated from statistics in appendix C-7.

The relationship between increases in employment and increases in the rate of unemployment by industrial sector apparently changed between the two halves of the postwar period. The difference in the relationship between increases in the rate of unemployment and the rate of increase in employment by industrial sector may have come about from several reasons. Labor force withdrawal and the manner of definition of unemployment by the sector of last employment are two possibilities. A third possibility is that members of an industrial sector who become unemployed may secure temporary employment in another industrial sector. They are very subject to unemployment in this new sector because of the marginal nature of their employment and their lack of qualification and training. The problem, therefore, with working with the structure of unemployment rates by industry or occupation is that a finding of no increase in structural difficulty may merely mean that the relatively unqualified can find jobs outside their sectors of primary attachment, but cannot hold these new jobs. It is for these reasons that the analysis in this chapter concentrates on changes in the structure of labor force participation and unemployment rates for classes of educational attainment and does not consider the structure of unemployment by industrial sector or occupational class.

A fourth problem inherent in the use of changes in unemployment rates and labor force participation rates as a means of testing for changes in structural difficulty is the

cyclical effect. During the first half of the postwar period, the Korean War created very high levels of aggregate demand and this was coupled with a decrease in the number of available men for the civilian economy because of the flow of men into the armed forces. There were recessions early in the postwar period in 1949 and 1954 which resulted in actual declines in GNP from one year to another.[1] This was quite different from the experience of 1960-62 when there was a high total rate of unemployment and a rate of positive economic growth that was too slow to maintain a full employment economy, given the increases in the labor force and the rate of growth in the productivity of labor. During recessions it should be expected that proportionally more unemployment would be created by layoffs than would be the case during a period of slow economic growth. More research on the propensity of industrial managers to fire workers under different economic conditions would be very useful. It is probable that the willingness to fire white collar workers has increased over time in the postwar period as the proportion of nonproduction to production workers has increased,[2] and the rate of profit

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[1]See appendix IV-B for quarterly changes in GNP during the recessions of 1949 and 1954 compared with the experience of 1960-62.

[2]See, for example, W. H. Gruber, New Standards for the American Economy, M.I.T. Sloan School of Management Working Paper 44-64, January 1964.

on sales and equity has decreased.[1] Production workers are considered to be direct labor and are treated as variable costs that fluctuate with volume in contrast to white collar employment which tends to be overhead labor that is considered as "fixed." Further research on whether there have been different effects on the structural nature of unemployment from the periods of equal total unemployment, but different sources of the unemployment would be helpful. Such research has not yet been done, and it must therefore suffice to make manifest that the earlier periods in the postwar period that had high unemployment rates were periods of recession and declining GNP. The years of high unemployment since 1957 have largely been years of too slow economic growth.

The section that follows gives an analysis of the changes in unemployment and labor force participation rates by educational class. The problems made manifest in this section of warnings have been avoided as much as possible in the section that follows. Since there are many ways of examining the structure of the labor force (see the first limitation cited in this section), no conclusions will be drawn in the following analysis until a number of possible tests of structural change are presented.

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[1] J. Roger Morrison and Richard F. Neuschel, "The Second Squeeze on Profits," _Harvard Business Review_ (July-August, 1962).

Changes Over Time in the Structure of Unemployment

and Labor Force Participation Rates

by Classes of Educational Attainment

This analysis will present the changes in the struc-
ture of unemployment and labor force participation rates by
first dividing the class rate by the total rate for each
year in order to obtain the relative structural position for
the year. In some cases a measure of change over time
will be obtained by dividing the relative structural po-
sition (defined as the ratio of class rate/total rate) in
a period late in the postwar period by the relative struc-
tural position in an earlier year. The result of this di-
vision will be called the "change in structure."

Table IV-F gives the unemployment rate by educational
class for persons 25 years of age and over for the years
1950 and 1960. The utilization of persons 25 years of age
and over is useful because it eliminates from the popula-
tion the younger entrants to the labor force who tend to
have higher unemployment rates because of age. It also
eliminates the recent flow of students into the labor
force who have experienced great social pressure to stay
in school, even though it is not obvious that additional
years of education are as useful for those who would have
normally dropped out of school with fewer years of attain-

ment.[1]

Since the total unemployment rates were approximately
equal (4.38/4.14 = 1.05), it is possible to observe that
there has been a shift in favor of those with more educa-
tion. This shift is measured in the "Change in Structure
1960/1950" given in Column (5), that has the 1960 ratio of
class rate/total rate (Column (4)) divided by the 1950
ratio of class rate/total (Column (2)). An index of over
1.00 indicates an unfavorable shift. An index of less than
1.00 indicates a shift in favor of a class. The poorer
position of those with fewer years of educational attain-
ment in 1960 will become more significant when changes in
participation rates by educational class are examined in
Table IV-G.

Table IV-F

Unemployment Rates for the Civilian Labor Force by Education:
1950 and 1960

(for persons 25 years of age and over)

Educational Status	1950* Unemployment Rate (1)	Class Rate / Total Rate (2)	1960 Unemployment Rate (3)	Class Rate / Total Rate (4)	1960/1950 Change in Structure (5)
Total Rate	4.1	1.00	4.4	1.00	---
No school years completed	7.3	1.75	8.3	1.88	1.07
1-4	...	...	7.7	1.75	...
5-7	...	...	6.9	1.56	...
1-7	5.9	1.43	7.1	1.61	1.13
8	4.6	1.10	5.6	1.27	1.16
9-11	4.5	1.07	5.1	1.16	1.08
12	2.9	0.69	3.1	0.71	1.03
13-15	2.6	0.62	2.5	0.58	0.94
16 or more	1.4	0.35	1.1	0.26	0.74

*Unemployment rates not adjusted to 1957 definitions.
Source: Appendix D-4.

[1]For an analysis of this observation, see Goodwin Watson
(editor), No Room at the Bottom: Automation and the Reluctant

The same form of presentation is given in Table IV-G for labor force participation rates by educational status for persons 25 years of age and over: 1950 and 1960. An index over 1.00 is favorable when the ratio class participation rate/total participation rate is considered, and a ratio less than 1.00 indicates an unfavorable relative position. In every case of comparisons of unemployment rates, it is good to have below average rates (less than 1.00). In every case for labor force participation rates, it is good to have above average rates (more than 1.00).

In both Table IV-F and Table IV-G, it is possible to discover two interesting facts about the importance of educational attainment as a means of determining structural differences. First, in both years it is obvious that there was a tendency for those with more education to experience a lower rate of unemployment and a higher rate of labor force participation. It is interesting to observe that the relative structural advantage that comes from additional education actually grew more significant in 1960 compared with 1950 despite the fact that there was a very substantial increase in the proportion of the total labor force with increased educational attainment.

There are many other ways of analyzing changes in labor force participation and unemployment rates by classes of

Learner (Washington, D.C.: National Education Association, 1963). The observation is relevant, of course, only for education as it is presently offered.

educational attainment as a test of structural disadvantage.

The most natural first step is to examine the labor force by

sexes. This analysis is given in Tables IV-H and IV-I.

Table IV-G

Labor Force Participation Rates by Education: 1950 and 1960

(Civilian Labor Force, 25 years and older)

Educational Status	1950 Participation Rate (1)	Class Rate Total Rate (2)	1960 Participation Rate (3)	Class Rate Total Rate (4)	1960/1950 Change in Structure (5)
Total Rate	55.0	1.00	56.5	1.00	1.00
No school years	37.9	0.69	29.6	0.52	0.76
1-4	...	...	44.9	0.80	...
5-7	...	...	51.8	0.92	...
1-7	51.0	0.93	49.7	0.88	0.95
8	53.6	0.98	53.6	0.95	0.97
9-11	57.4	1.04	62.3	1.10	1.06
12	57.0	1.04	61.3	1.09	1.05
13-15	59.0	1.07	64.0	1.13	1.06
16+	71.3	1.30	76.6	1.36	1.05

Source: Manpower Report of the President, 1964, op. cit., pp. 267-68.

Table IV-H

Labor Force Unemployment Rates by Education and Sex: 1950 and 1960

(for persons 25 years of age and over)

Educational Status	1950* Unemploy- ment Rate (1)	Class Rate Total Rate (2)	1960 Unemploy- ment Rate (3)	Class Rate Total Rate (4)	1960/1950 Change in Structure (5)
Males					
Total Rate	4.2	1.00	4.3	1.00	1.00
Less than					
8 years	6.0	1.43	7.1	1.66	1.16
8 years	4.6	1.09	5.5	1.27	1.17
9-11	4.3	1.03	4.8	1.11	1.08
12	2.8	0.67	2.8	0.66	0.99
13-15	2.6	0.62	2.5	0.57	0.92
16+	1.5	0.35	1.1	0.23	0.66
Females					
Total Rate	4.0	1.00	4.6	1.00	1.00
Less than					
8 years	6.2	1.57	7.1	1.55	0.99
8 years	4.5	1.14	5.8	1.26	1.11
9-11	4.8	1.21	5.7	1.25	1.03
12	2.9	0.73	3.6	0.78	1.07
13-15	2.4	0.61	2.7	0.58	0.95
16+	1.3	0.33	1.3	0.27	0.82

*Unemployment rates not adjusted to 1957 definitions.

Source: Manpower Report of the President, 1964, op. cit., pp. 267-68.

It is interesting to observe that the total unemployment rate of females increased relative to the total rate for males between 1950 and 1960. This in part may be explained by the fact that the labor force participation rate of males with little education fell while the labor force participation rate

of males with higher educational attainment <u>rose</u>. In contrast

to the male experience, the rate of labor force participation

for females <u>increased</u> between 1950 and 1960 for both the high

and low educational classes, and the increase was more rapid

for those with low educational attainment than was the case

for those with high educational attainment.

Table IV-I

<u>Labor Force Participation Rates by Education and Sex</u>:
1950 and 1960

(for persons 25 years of age and over)

Educational Status	1950 Participation Rate (1)	1950 Class Rate / Total Rate (2)	1960 Participation Rate (3)	1960 Class Rate / Total Rate (4)	1960/1950 Change in Structure (5)
Males					
Total Rate	83.4	1.00	81.9	1.00	1.00
Less than 8 years	76.6	0.92	67.0	0.82	0.89
8 years	83.8	1.00	77.3	0.94	0.94
9-11	89.5	1.07	87.9	1.07	1.00
12	90.6	1.09	90.6	1.11	1.02
13-15	85.6	1.03	88.2	1.08	1.05
16+	89.1	1.07	91.4	1.12	1.05
Females					
Total Rate	28.0	1.00	36.8	1.00	1.00
Less than 8 years	21.2	0.76	26.9	0.73	0.96
8 years	23.6	0.84	31.1	0.85	1.01
9-11	28.8	1.03	39.7	1.08	1.05
12	32.2	1.15	40.6	1.10	0.96
13-15	35.9	1.28	42.5	1.15	0.90
16+	47.3	1.69	53.7	1.46	0.86

Source: <u>Manpower Report of the President, 1964</u>, <u>op</u>. <u>cit</u>., pp. 267-68.

The labor force participation rates of all males of prime

working ages in 1952 and 1962 are presented in Table IV-J.

Table IV-J

Male Labor Force Participation Rates by Age and Education:
October 1952 and March 1962

Years of School Completed	35-44 Years of Age		45-64 Years of Age	
	Oct. 1952	Mar. 1962	Oct. 1952	Mar. 1962
Less than 5 years	93.9	91.4	88.4	81.8
5-7 years	96.0	94.5	91.5	87.9
8 years	98.6	96.4	93.7	91.2
9-11 years	98.1	97.7	93.8	93.7
12 years	97.9	98.1	93.6	94.9
13-15 years	97.8	98.7	94.7	94.4
16 or more	98.7	99.0	94.7	96.1

Sources:

Oct. 1952 - U.S. Dept. of Commerce, Bureau of the Census, Current Population Reports: Labor Force, Series P-50, No. 49, Table 5, "Educational Attainment and Literacy of Workers: October 1952," p. 11.

Mar. 1962 - U.S Dept. of Labor, Bureau of Labor Statistics, Special Labor Force Report No. 30, 1963, Table E, "Educational Attainment of Workers, March 1962," p. A-9.

March 1962 participation rates for ages 45-64 were calculated from data in Special Labor Force Report No. 30, because 1952 data was available for 45 to 64 and 1962 data was given for 45 to 54 and 55 to 64.

A clear pattern of greater labor force participation as a

function of educational attainment did not exist in 1952, but

had become very manifest by 1962. If one accepts 13 or more

years as the group of high educational attainment and eight years

or less of education as being of low educational attainment, then

the following tabulation can be made of the classes within this

dichotomy. In the four classes of high educational attainment
(2 classes in age bracket times 2 age brackets), it is found
that the labor force participation rates <u>increased</u> in three
of the four classes. In the six classes of low educational
attainment (3 classes in age bracket times 2 age brackets),
labor force participation rates decreased in all six classes.
The magnitude of the differences should also be noted. For
example, males with 12 years of education who were between
the ages of 45 and 64 had a labor force participation rate
in 1962 of 94.9; males with less than 5 years of education-
al attainment in this age bracket had a labor force partici-
pation rate of 81.8 or a difference of 13 points. Another
way of stating this difference is to observe that the parti-
cipation rate of the males with 12 years of educational at-
tainment was 15 percent greater (94.9/81.8) than that of the males
with less than 5 years of education.

Another interesting phenomenon that can be seen in
Tables IV-G and IV-J is the fact that a difference of only
one or two years of educational attainment appears to create
a significant increase in labor force participation. Members
of the population with 5-7 years tend to have a greater labor
force participation rate than those with less than 5 years of
educational attainment. Eight years of educational attain-
ment results in a greater labor force participation rate than
does 5-7 years of educational attainment. From the unem-
ployment rates given in Table IV-F, it is possible to make

this same observation for the effect that a little more educational attainment has in lowering the rate of unemployment.

An analysis of white-nonwhite participation rate changes may shed further light on the withdrawal from the labor force of those with poor employment opportunities. If it is true that demand for labor in the goods producing and unskilled work sectors traditionally employing many nonwhite workers has been decreasing, then one would expect to find that non-white participation rates have been falling relative to white participation rates. Chart IV-E presents the change in participation rates between 1948 and 1962 by age and sex. The line bisecting the origin represents the line of equal change. Points to the right of this line represent an increase in white participation relative to nonwhite participation or a decrease in nonwhite participation relative to white participation. This test of equal change shows that whites gained on nonwhites in thirteen of fourteen age classes. Table IV-K presents the relative change in participation rates for the periods 1948-1957, 1957-1962, and 1948-1962 for males and females by age class. Table IV-K gives the nonwhite change in participation rates divided by the white participation rate change. A "D" signifies that both whites and nonwhites for the age class decreased in participation rates. A "D" above 1.00 indicates that nonwhites decreased in participation more rapidly than whites and this would be considered an indication

Chart IV-E

Changes in Participation Rates, 1948-62: Comparison between Whites and Non-Whites by Age and Sex
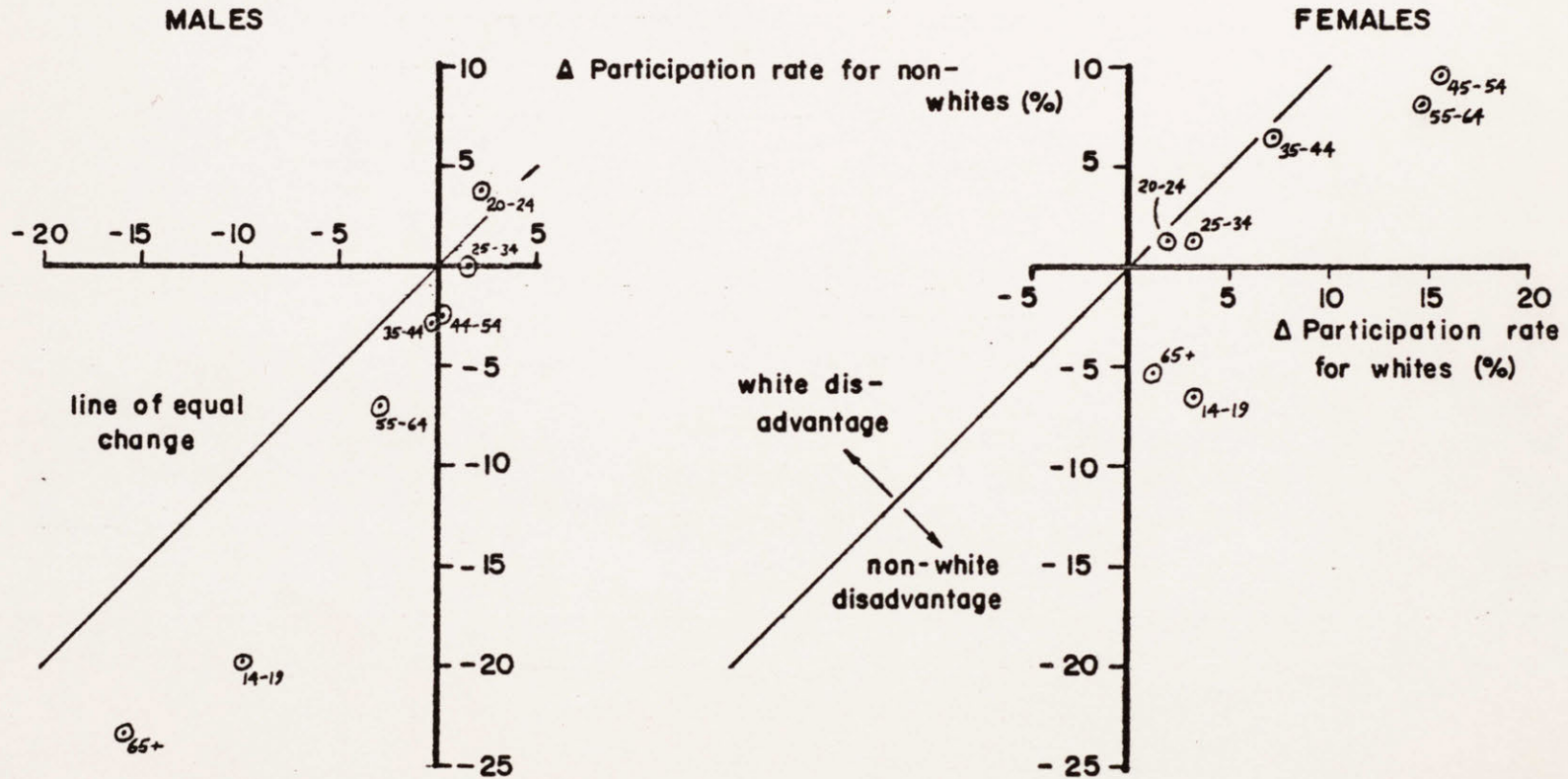
Source: Appendix B-4.

Table IV-K

Comparison Between White and Nonwhite Labor Force Participation Rate Changes by Age and Sex: 1948-57, 1957-62, 1948-62

	Nonwhite Change/White Change		
Age Class	1948-57	1957-62	1948-62
Male			
Total	1.82 D	1.29 D	1.50 D
14-19	2.49 D	1.54 D	2.01 D
20-24	1.74 I	1.50 D	1.76 I
25-34	0.72 I	*	*
35-44	7.00 D	**	27.00 D
45-54	*	2.16 D	25.00 D
55-64	2.91 D	1.00 D	2.45 D
65 +	1.62 D	1.24 D	1.45 D
Female			
Total	0.27 I	0.11 I	0.24 I
14-19	3.13 D	1.13 D	*
20-24	*	1.58 I	0.75 I
25-34	*	2.50 I	0.50 I
35-44	0.87 I	1.12 I	0.90 I
45-54	0.48 I	1.03 I	0.60 I
55-64	0.64 I	0.42 I	0.58 I
65 +	*	2.20 D	*

Key: D = decrease in both whites and nonwhites;
     I = increase in both whites and nonwhites;
     * = nonwhite decreased or remained the same; whites increased, and
    ** = nonwhite decreased; whites remained the same.

Those classes that resulted in nonwhite advantage are underlined.

Source: Appendix B-4.

of relative disadvantage. An "I" refers to situations
when both white and nonwhite members of an age class in-
crease in participation rates. Here an index above 1.00
indicates an advantage for nonwhites as they increase in
participation rate faster than whites.

An examination of Table IV-K gives interesting in-
sights into labor market activity in the postwar period.
First, the difference in participation rates by sex is
made clearly manifest. The trend toward greater female
participation rates at a time of decreasing male partici-
pation rates appears through almost all age brackets. The
female nonwhite advantage in the period between 1957 to
1962 may provide further fuel to the "additional worker"
controversy.[1]

W. S. Woytinsky had a "hypothesis" (he admits that it
is not a "universally accepted theory"[2]) that additional
workers enter the labor market during boom and depression
periods. Clarence Long, in contrast, has concluded "that
a rising tide of unemployment during a severe depression
causes more people to leave than to enter the labor force,
with the result that participation shows a net decline."[3]

[1]Clarence Long has covered this issue with remarkable
clarity in Chapter 10 of his The Labor Force Under Changing
Income and Employment, op. cit., pp. 181-201.

[2]W. S. Woytinsky and Associates, Employment and Wages
in the United States (New York: The Twentieth Century Fund,
1953), p. 323.

[3]Long, op. cit., p. 200.

Professors Strand and Dernburg found that additional
workers did enter the labor force but approximately twice
that number left the labor force in discouragement -- there-
by giving a net decline in participation rates which is con-
sistent with the findings in this chapter.[1]

Perhaps the "purest" measure of the relationship
between educational attainment and unemployment and partici-
pation rates is a combination of data which removes from con-
sideration females, nonwhites, very young and very old workers.
Charts IV-F and IV-G present participation rates and unemploy-
ment rates by classes of educational attainment for white
males considered to be of prime working age. It will be ob-
served that the greater the educational attainment, the
lower was the rate of unemployment and the greater was the
rate of labor force participation. The reason why a combi-
nation of these two measures of structural difficulty is
necessary can be seen from the very significant difference
in the participation rates of white males in the 35-44 age
bracket. They participated in 1960 at a rate of 89.2 per-
cent if they had less than 8 years of education; yet par-
ticipated at a rate of 97.8 percent if they had 12 years of
education.

The change between 1950 and 1960 in the structure

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[1]Kenneth Strand and Thomas Dernburg, "Cyclical Vari-
ation in Civilian Labor Force Participation," Review of
Economics and Statistics, Nov. 1964, pp. 375-391.

Charts IV-F and IV-G

Unemployment and Labor Force Participation Rates
vs. Education for White Males by Age: 1960

Chart IV-F: 35-44 yrs.
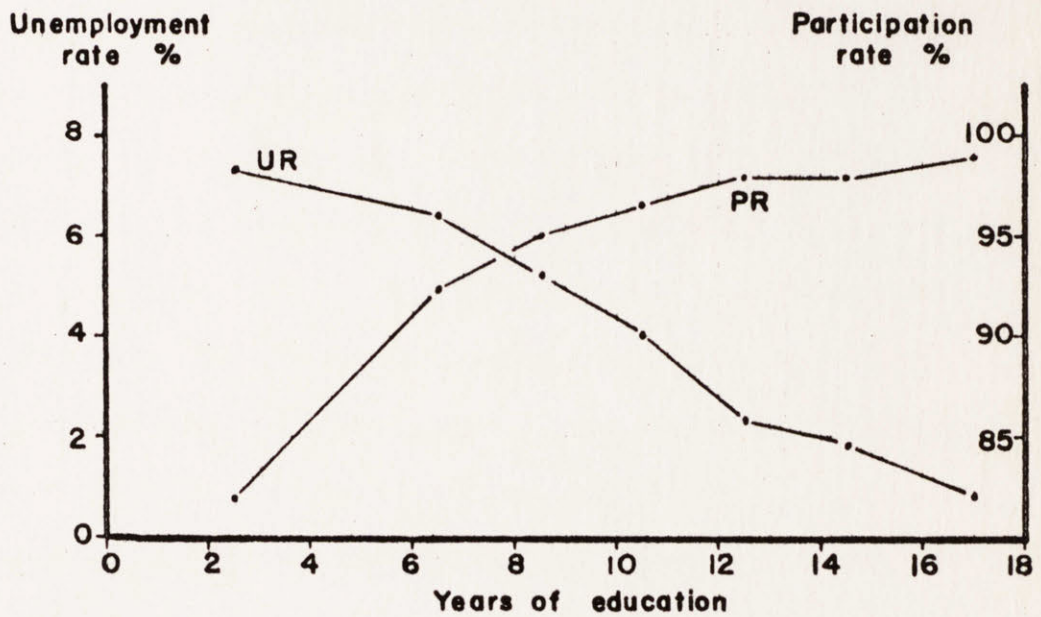
Chart IV-G: 45-54 yrs.
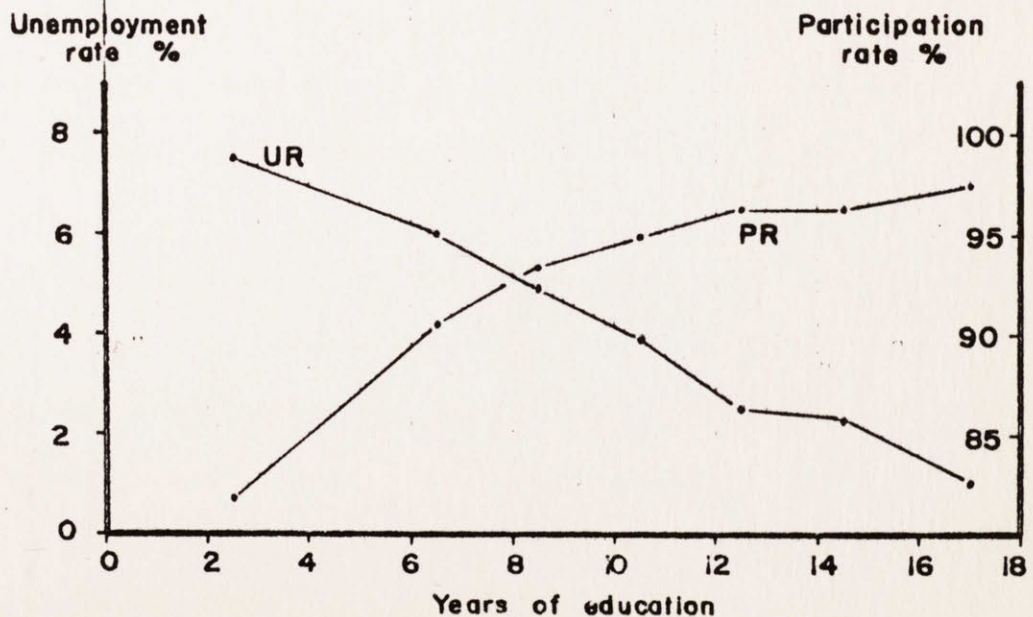
Source: Appendix D-5.

of labor force participation and unemployment rates for
white males of the prime working ages of 35-44 and 45-54 is
presented in Charts IV-H and IV-I. It will be observed that
labor force participation rates increased for white males
with higher levels of educational attainment and decreased
for males with low levels of educational attainment. In con-
trast to labor force participation rates that represent an
improvement in structural position when they increase for a
class relative to the average, unemployment rates give evi-
dence of a decline in relative position when they increase
for a class relative to the average. It will be observed
in Charts IV-H and IV-I that unemployment rates increased
for white male members of the labor force between the ages
of 35-44 and 45-54 with low levels of education. The rate
of unemployment decreased for the white males of prime wor-
king ages with higher levels of educational attainment.
The level of total unemployment for each of these classes
of white males 35 to 44 and 45-54 was equal in both 1950
and 1960. That is, a rate of unemployment for all white
males 35-44 years of age was 3.3 percent in 1950 and 1960.
It was 3.9 percent in 1950 and 1960 for all white males
45-54 in age.

This would indicate that 1950 and 1960 were periods of
approximately equal economic activity if the demand con-
ditions for white males of prime working force ages can be
measured by the unemployment rate for all members of a
class such as all white males of a given age. The 1950 un-

Chart IV-H: 35-44 yrs.

Charts IV-H and IV-I

Change in Unemployment and
Participation Rates vs.
Education for White Males by
Age: 1950-60

UR 1960 = UR 1950 = 3.3 %

1960 rate — 1950 rate (in %)

Years of education

Chart IV-I: 45-54 yrs.

UR 1960 = UR 1950 = 3.9 %

Source: Appendix D-6.
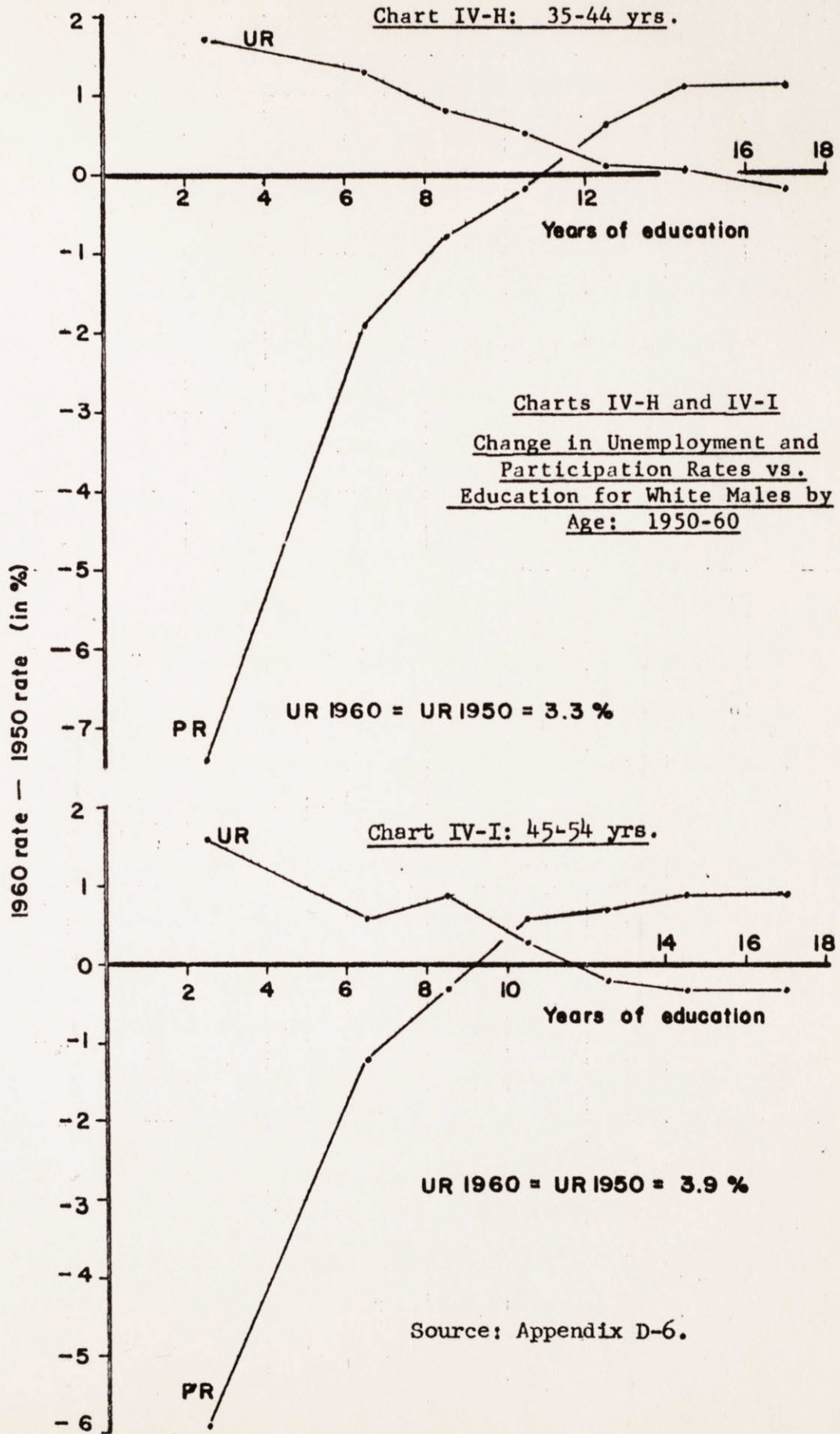
employment rates have not been adjusted for the 1957 definitions of unemployment. This would indicate that 1950 was a year of relatively poorer employment opportunities for white males of these age classes than was 1960. The total adjusted rate for all males in the labor force was 5.1 percent in 1950 and 5.4 percent in 1960.[1] It can be seen that these were periods of approximately equal economic activity as measured by the level of unemployment. This would meet Professor Solow's test requirement of equal economic activity, and it can be seen that there was a substantial deterioration in the relative position of the members of the population with low levels of education. Tables IV-M and IV-N will present findings by Clarence Long that give evidence of a decline in relative position of the poorly educated even at roughly equal levels of economic activity. The consistent relationship between the adverse changes in both labor force participation and unemployment rates emphasizes the importance of the utilization of both measures together as a means of evaluating the total magnitude of the deterioration in the structural position of the poorly educated.

The various ways that the changes in unemployment and labor force participation rates may be analyzed that have been presented in this section all seem to lead to the con-

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[1] Manpower Report of the President, 1964, op. cit., p. 195.

clusion that the disadvantage of members of the labor force
with low levels of education has become worse over time
during the postwar period. This conclusion therefore places
the findings of this thesis in conflict with much of the
economic analysis on the subject that has been published
during the last four years. The debate over whether struc-
tural unemployment has worsened will now be used to provide
perspective on the findings in this chapter.

Has Structural Unemployment Worsened?

It will be useful to begin this section with the intro-
duction to R. A. Gordon's excellent summary of the literature
addressed to this question:

> UNEMPLOYMENT in the United States has not
> averaged below 5.5 percent of the labor force in
> any year since 1957. Furthermore, it has shown
> a distressing tendency to creep upward during the
> last three business cycles. The inevitable
> questions result: Why? And what can and should
> we do about it?

> The "why?" has led to a debate, which still
> goes on, as to how much of the recent high level
> of unemployment is due to a deficiency of aggre-
> gate demand -- to a failure of total spending on
> goods and services to rise at a sufficiently
> rapid rate -- and how much is the result of
> "structural" changes which make a growing frac-
> tion of the labor force unsuited for the jobs
> that are available. Most of the recent studies
> that have addressed themselves to this problem
> come to the conclusion that such structural
> changes account for little of the net increase
> in unemployment over the last half-dozen years
> or so.[1]

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[1] R. A. Gordon, "Has Structural Unemployment Worsened?"
Industrial Relations, May 1964, p. 53.

The research of the economists[1] who have found that there has been no increase in structural unemployment has seemed so conclusive that Professor Simler was led to begin his article in the American Economic Review:

> To submit the rise-in-structural unemployment
> hypothesis to yet another test may strike some
> as pretty much like subjecting an apparently
> dead horse to one last thumping.[2]

There have been some[3] who have questioned the finding that there has been no increase in structural unemployment.

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[1] See, for example, Higher Unemployment Rates, 1957-60: . . . , op. cit., Robert M. Solow, op. cit.; the papers by Walter Heller and Otto Eckstein in A. M. Ross, editor, Unemployment and the American Economy (New York: Wiley, 1964); L. E. Galloway, "Labor Mobility, Resource Allocation, and Structural Unemployment," American Economic Review, LIII (September 1963), 694-716; and Economic Report of the President, January 1964, op. cit., especially Appendix A.

[2] N. J. Simler, "Long-Term Unemployment, the Structural Hypothesis, and Public Policy," American Economic Review, December 1964, p. 985.

[3] The literature in favor of this side of the dispute has been largely descriptive in nature. The following examples of the structuralist position were gathered together by R. A. Gordon:

See, for example, Thomas B. Curtis, 87 Million Jobs (New York: Duell, Sloan, and Pearce, 1962); also the testimony of W. D. Fackler in Unemployment Problems, Hearings before the Special Committee on Unemployment Problems, U.S. Senate, 86th Cong., 1st Sess. (Washington, D.C.: Government Printing Office, October 1959), p. 1, pp. 44ff.; Employment in The Dynamic American Economy, Republican Policy Committee of the House of Representatives in the Congressional Record (87th Cong., 1st Sess., 1961); and two papers by C. C. Killingsworth, one read at a Conference on Employment Security at Michigan State University, October 26, 1963, and the other reproduced in Nation's Manpower Revolution, Hearings before the Subcommittee on Employment and Manpower of the Senate Committee on

Most economists, however, would concur with this conclusion

by Professor Gordon:

> Whether we concentrate our attention on teenagers
> (before 1963), on blue collar workers, on the un-
> skilled, on nonwhites, on the least educated,
> or on workers in the industries supposedly most
> affected by automation -- in none of these cases
> has the unemployment situation worsened <u>relatively</u>
> when we take account of the rise in the total un-
> employment since the mid-fifties.[1]

Objectives of Unemployment Analyses

Much of the analysis that has been performed on the

structural nature of unemployment and its changes over time

in the postwar period has been undertaken in order to pro-

vide insight into several public policy questions. In order

to evaluate the literature, it is necessary to specify the

reasons for the research. The following public policy

questions have been of interest:

(1) Have increases in the structural nature of
     unemployment since 1957 been the cause of the
     rise in the total rate of unemployment from
     the "full employment" unemployment level of
     4 percent?

(2) Have "automation" and other causes of the
     shift in the requirements of skills in the

Labor and Public Welfare, 88th Cong., 1st Sess.
(Washington, D.C.: September-November, 1963), pt.
5, pp. 1461-83. The entire set of the Hearings
last cited might also be mentioned in this con-
nection.

[1]R. A. Gordon, "Has Structural Unemployment Worsened?,"
p. 54.

labor force made it more difficult for
members of the population with low skill
attainment to obtain employment?

(3)   Have changes in the structural nature of
unemployment made it more difficult to re-
turn through the use of increased aggregate
demand to the "full employment" unemployment
level that was experienced from 1955-57?

It is with regard to question (1) that economists are
in agreement: A negative answer to this question may be
given without equivocation. The methodology and findings
of R. A. Gordon are presented in Table IV-L. Although
there was an increase in structural difficulty at equal
levels of unemployment <u>for members of the labor force with
low educational attainment</u> (compare Columns (1) and (4)
of Table IV-L), the proportion of the total group of unem-
ployed males, 18 or over, with low levels of education fell
very significantly between 1950 and 1963 (compare Columns
(9) and (12) of Table IV-L). Thus, in the period since
1957, structural problems as measured by class unemployment/
total unemployment have not become significantly worse, and
measures to increase aggregate demand such as the tax cut
were clearly justified.

It is necessary, however, to emphasize the difference
between questions (1) and (2). If one is interested in
whether there are qualified workers available for employment
generated by increased demand, as in question (1), then the
utilization of the concept class unemployment/total unemploy-
ment is an adequate test. If one is interested in how members

Table IV-L

Educational Classification of the Unemployed, Males 18 and Over: Selected Years 1950-1962

Years of school completed	Ratio of unemployment rate in each group to unemployment rate for all males 18 and over.				Percentage of male labor force, 18 and over, in each group.				Percentage of male unemployed, 18 and over, in each group.			
	(1) 1950	(2) 1957	(3) 1959	(4) 1962	(5) 1950	(6) 1957	(7) 1959	(8) 1962	(9) 1950	(10) 1957	(11) 1959	(12) 1962
0-7	1.35	1.68	1.56	1.53	25.2	19.2	17.2	15.4	34.2	32.5	27.0	23.7
8	1.06	1.07	1.16	1.25	20.1	17.1	15.9	14.2	21.3	18.4	18.5	17.8
9-11	1.11	1.15	1.29	1.30	19.1	19.6	20.2	19.6	21.2	22.8	26.0	25.7
12	0.74	0.73	0.78	0.80	21.2	26.2	27.2	28.7	15.6	19.3	21.2	22.9
13-15	0.66	0.66	0.52	0.67	7.3	8.3	9.1	10.4	4.9	5.6	4.9	7.0
16 or more	0.35	0.15	0.22	0.23	7.0	9.6	10.4	11.7	2.5	1.5	2.4	2.8

Unemployment rate, all groups (per cent)   6.2   4.1   6.3   6.0

Source: R. A. Gordon, "Has Structural Unemployment Worsened?" p. 73.

The unemployment rates for 1950 have not been adjusted to 1957 definitions.

of a group are faring with regard to relative unemployment rates, a more useful concept is class rate/total rate.[1] Part of the conflict over whether structural unemployment has worsened may be attributed to differences in interest, which tend to lead to a concentration of attention on a particular facet of an issue.

In attempting to answer the question of whether it has become more difficult for those with low educational attainment to obtain employment (question (2)), it is the contention of this thesis that the behavior of labor force participation rates by level of educational attainment is as important as the structural behavior of unemployment rates.

All of these studies that have come to the conclusion that there has been no increase in structural unemployment have concentrated solely on the rate of unemployment. The fact that members of the labor force leave the labor force or accept part-time employment has been recognized in some of these studies. For example, when Robert M. Solow was arguing that the economy had been performing in a far less satisfactory manner in the latter part of the postwar period,

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[1]It may be helpful to note that:

$$\frac{\text{class rate}}{\text{total rate}} \text{ is calculated from } \frac{\dfrac{\text{unemployment of a class}}{\text{labor force of the class}}}{\dfrac{\text{total unemployment of all workers}}{\text{total labor force}}}$$

This gives the relative depth of unemployment in any one class. The ratio unemployed workers in a class/total unemployed workers gives the proportion of total unemployment held by a class but, in itself, gives no indication of the severity of unemployment within the class.

he stated:

> If some account is taken of the (1) loss of
> work through part-time unemployment, and of
> the (2) probable number of disappearances
> from the measured labor force because of the
> lack of jobs, the difference between the
> tight early years and the soft later years
> appears more marked. Allowance for the first
> of these adjustments gives an average unem-
> ployment rate of 5.2% for 1956-1957 and 7.1%
> for 1958-63. A more conjectural adjustment
> for the second factor alone (for which I am
> indebted to Professor Thomas Dernburg of
> Oberlin College) suggests an increase in the
> unemployment rate from 4.8% in 1953 to 9.5%
> in 1962, with every year from 1958 on showing
> a higher rate than the recession year 1954.[1]

Professor Solow, however, made his analysis without
considering the limitations of the exclusive use of un-
employment figures that were suggested in an earlier section
of this chapter. Clarence Long did address himself to the
link between unemployment rates and labor force participation
rates, and he also heeded the opinion of Professor Solow
that one should select two periods of roughly equal levels
of economic activity.[2] His analytic approach is presented
in Tables IV-M and IV-N. Dr. Long did not examine the
proportions of total unemployment held by those with low
educational attainment.

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[1] Robert M. Solow, op. cit., p. 15.

[2] Clarence Long in testimony on Employment and Unemploy-
ment, Hearings . . . . , pp. 377-378.

Table IV-M

Unemployment Rates of Males 18 and Older by Education:

1950 and 1959

(percent of civilian labor force)

Years of Education	1950[1]	1959	Percent Change of labor force	1950 rate
0 to 4	8.5	9.9	+1.4	+16
5 to 7	8.3	9.7	+1.4	+17
8	6.7	7.3	+0.6	+ 9
9 to 11	7.1	8.1	+1.0	+14
12	4.7	4.9	+0.2	+ 4
13 to 15	4.3	3.3	-1.0	-23
16 plus	2.3	1.4	-0.9	-39
Males 18 and older	6.3	6.3	0	0

[1]All unemployment rates in 1950 adusted upward: (1) for census undercount of labor force and unemployment compared with the Current Population Survey, and (2) for persons with a job but on temporary layoff or waiting to be called to a new job, excluded from the unemployment classification in 1950 but included in 1959.

Source: Testimony of Clarence Long, Employment and Unemment,"Hearings . . . . " op. cit., p. 378.

Table IV-N

Not-in-Labor-Force Rates of Males 18 and Older by Education: 1950 and 1959

	(percent of civilian noninstitutional population)			
			Percent Change of civilian non-institutional	
Years of education	1950[1]	1959	population	1950
0 to 4	24.0	34.8	+10.8	+45
5 to 7	15.1	22.3	+ 7.2	+48
8	12.5	17.4	+ 4.9	+39
9 to 11	8.6	10.0	+ 1.4	+16
12	7.0	7.3	+ .3	+ 4
13 to 15	21.4	16.6	- 4.8	-22
16 plus	8.3	7.2	- 1.1	-13
Males 18 and older	13.5	14.8	+ 1.3	+10

[1]Non-in-labor force in 1950 adjusted (1) to exclude institutional inmates from population; (2) to exclude persons whose labor force participation was undercounted at the census of 1950 compared with the current population survey conducted in the same month.

Source: Ibid., p. 379.

The attempt to observe structural conditions at equal levels of economic activity that Professor Solow suggested may not be useful for other reasons than his failure to incorporate participation rates into the analysis. Professor Solow's level of economic activity was measured by the rate of unemployment. It was observed earlier that an identical rate of unemployment has a different affect upon structural conditions if the rate of unemployment is caused by a recession than if it is caused by too slow a rate of economic growth. The rate of unemployment has a different impact on

labor force participation rates if it is experienced during
a brief recession when the unemployment rate changes rapidly
as it did between the 1948 rate of 3.8 percent and the 1949
rate of 5.9 percent,[1] than is the case if there is slow eco-
nomic growth as there was from 1955 to 1962. It is not
believed completely possible to normalize structural changes
by the total rate of unemployment in order to compare periods
of different levels of economic activity. Clarence Long
was able to demonstrate that, at equal levels of unemployment,
there was an increase in structural disadvantage for the
poorly educated. This does not prove, however, that if
the total level of economic activity had been high enough
to keep the economy at full employment there would still
have been an increase in structural disadvantage.

The importance of including participation rates in the
analysis of the relative position vis-a-vis the labor mar-
ket of those with low educational attainment is emphasized
by an examination of the period 1957 to 1962. Shifts in the
unemployment structure during this period tended to favor
this group. However, changes in labor force participation
rates between 1957 and 1962 made manifest the continuing
disadvantage of those with low levels of educational at-
tainment.

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[1]Manpower Report of the President, 1964, op. cit., p.
195.

This can be seen very clearly for males 65 years of age and over with 8 years or less of education. The labor force participation rates for this class went from 34.1 in 1957 to 25.3 in 1962; a decline of over 25 percent. In contrast, males 65 years of age and over with 13 or more years of educational attainment experienced a decline in labor force participation rates from 55.3 in 1957 to 49.6 in 1962; a decline of only 10 percent.[1] Males with 8 years or less of education between the ages of 18 and 64 decreased in labor force participation rate from 90.2 in 1957 to 87.6 in 1962. In contrast, males with 16 or more years of education between the ages of 18 and 64 had no change in their labor force participation rates despite the fact that the trend toward graduate school education increased very substantially between 1957 and 1962.[2] The relative decline in the labor force participation rates of nonwhite males was very evident between 1957 and 1962. This may be seen in Table IV-K.

It should be noted, moreover, that the decline in the relative position of members of the population with low educational attainment appears much more serious if the whole period 1950 to 1962 is considered rather than only the period of higher total unemployment rates, 1957 to 1962.

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[1] Appendix D-3.

[2] Appendices D-1 and D-2.

If the year 1950 is compared with 1960 or 1962 (see

Tables IV-G, -H, -I, -J, -K, -L, -M, and -N) then the

structural nature of unemployment rates alone leads to the

finding that there has been a worsening of the structural

disadvantage of the poorly educated.

It is possible that the year 1957 is not the optimal

period to choose as a base for the purpose of comparing

structural change between a period of full employment and

a later period of slack, because in the years just prior

to 1957 the economy behaved in a rather peculiar manner.

GNP increased by only 2 percent a year between 1955 and

1957.[1] Despite this slow growth, the rate of unemployment

only increased from 3.5 percent in the fourth quarter of

1955 to 4.3 percent in the first quarter of 1957.[2] The

number of manufacturing production workers decreased from

13,541,000 in the fourth quarter of 1955 to 13,469,000 in

the first quarter of 1957 despite the fact that the number

of nonproduction workers in manufacturing increased from

3,667,000 in the fourth quarter of 1955 to 3,944,000 in

the first quarter of 1957, or by 7.6 percent.[3]

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[1] U.S. Income and Output, 1957, op. cit., p. 119, for
1955. Survey of Current Business (July 1962), for 1957.

[2] Department of Commerce, Bureau of Census, Current
Population Reports - Labor Force, Series P-57, No. 164 and
No. 178: "The Monthly Report on the Labor Force: February
1956 and April 1957.

[3] U.S. Department of Labor, Bureau of Labor Statistics,
Employment and Earnings Statistics for the United States,
1909-1964 (Washington, D.C.: Government Printing Office,
1964), pp. 591 and 605.

It is unfortunate, therefore, that the Monthly Survey
of March, 1957 is the only information that is available
to use as a base for comparisons of structural change be-
tween 1957 and 1962, because the slow growth between 1955
and 1957 seems to have had a more severe impact on workers
with lower levels of educational attainment,[1] and for some
reason this was not reflected in an increase in the total
rate of unemployment.

It may be useful at this point to restate question
(2).

> (2) Have "automation" and other causes of the
>   shift in the requirements of skills in
>   the labor force made it more difficult
>   for members of the labor force with low
>   skill attainment to obtain employment?

The question of the impact of productivity increases
on the industrial and occupational structures was analyzed
in Chapters II and III of this thesis. The finding of
those chapters was that the goods-producing sectors tra-
ditionally employing blue collar workers had more rapid
increases in productivity and smaller increases in employ-
ment than those sectors with less rapid increases in produc-
tivity.[2] Given the statistics on unemployment and partici-

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[1] This is based on the median educational attainment
statistics by occupational class.

[2] This finding is in conflict with the conclusions of
John Kendrick, and an analysis of this difference may be
found in appendix IV-D of this chapter.

pation rates by educational attainment shown in this

chapter,[1] it does appear that the rapid shift from blue

collar to white collar employment did result in an increase

in structural disadvantage for those members of the popula-

tion with low levels of education. Whether this would have

happened if aggregate demand had been kept sufficiently high

is an interesting, but unanswerable question.

The third question which has concerned economists

studying postwar labor market adjustment is the following:

> (3) Have changes in the structural nature of
> unemployment made it more difficult to
> return, through the use of increased ag-
> gregative demand, to the "full" employ-
> ment-unemployment level that was ex-
> perienced between 1955 and 1957?

The economists who have found that there has been

no increase in the volume of structural unemployment have

not answered question (3). In their answer to the first

question they gave an implied answer to this third question

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[1]For imaginative and comprehensive summaries of the re-
search that has been conducted on other structural facets
of unemployment (such as age, sex, geographical region,
occupation, etc.) the works of R. A. Gordon and Robert M.
Solow, op. cit., are recommended. It will be found that
the conclusions presented in parts of their analyses con-
flict with the findings in this chapter. The section of
this chapter "A Warning on the Use of Unemployment and Labor
Force Participation Rates" will explain much of the con-
flict in conclusions. Another source of conflict is in
the definition of the questions under analysis, and this
difference is made manifest in the concluding section of
this chapter.

that was similar to their first answer. The Council of

Economic Advisors did make explicit that there had been no

change in the difficulty (or ease) with which the economy

could be brought back to a 4 percent level of unemployment.

> In the existing economic circumstances, an un-
> employment rate of about 4 percent is a reason-
> able and prudent full employment target for
> stabilization policy. If we move firmly to re-
> duce the impact of structural unemployment, we
> will be able to move the unemployment target
> steadily from 4 percent to successively lower
> rates.

> The recent history of the U.S. economy contains
> no evidence that labor and commodity markets are in
> general excessively "tight" at 4 percent unemploy-
> ment. Neither does it suggest that stabilization
> policy alone could press unemployment significantly
> below 4 percent without creating substantial up-
> ward pressure on prices.[1]

James Knowles also found that there should be no diffi-

culty in returning to a 4 percent level of unemployment:

> In summary, if it is agreed that a 4 percent un-
> employment rate was readily attainable without
> inflation during the period prior to 1957, then
> it should have been possible during 1957-60, and
> should be possible during the current expansion,
> to reduce the unemployment rate at least to 4.5
> percent, and more probably to 4.0-4.2 percent,
> before running into structural resistance to
> further expansion of output and employment.[2]

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[1]Economic Report of the President, 1962, (Washington,
D.C.: Government Printing Office, 1962), p. 46.

[2]Higher Unemployment Rates, 1957-60: . . . , op. cit.,
p. 79.

The magnitude of the decrease in labor force partici-
pation rates was probably not evident when these conclu-
sions by the CEA and James Knowles were written. It is
now accepted that the labor force declines because some
members cease to participate when demand for their services
decreases. The CEA now includes in potential GNP "the
output that could be produced by people who would leave the
ranks of the unemployed and also by many who are not cur-
rently counted in the labor force but who would be at work
if unemployment were reduced to 4 percent. Some people who
are ready and willing to work have concluded that jobs are
not available; they are not actively seeking employment
and are therefore not counted as unemployed."[1] Walter
Heller estimated that in 1963 the magnitude of the group
that would enter the labor force given sufficient demand
was approximately 800,000 workers.[2]

As soon as one considers the task of returning to a 4
percent level of unemployment, the question of increases in
structural difficulty ceases to be a "dead horse" issue.
It was found in this chapter that there were labor force
participation rate increases for males with high levels of

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[1] Economic Report of the President, 1965 (Washington,
D.C.: Government Printing Office, 1965), p. 83.

[2] Walter Heller, "The Administration's Fiscal Policy,"
in Arthur M. Ross (editor), Unemployment and the American
Economy (New York: Wiley, 1964), p. 105.

educational attainment and participation, and this finding
was true even for white males of prime working ages. If it
is believed that increased demand for labor will bring dis-
couraged workers back into the labor force, then it is pos-
sible that the proportion of unemployed workers with low
skill levels would again increase and structural problems be-
come more severe than they are at present. This return to
the labor force effect might be eased by a shift in the
occupational and industrial structures because of the
cyclical effect that was analyzed earlier.

It is clearly beyond the scope of this thesis to at-
tempt to answer question (3). When such an attempt is made,
the presentation of data in this chapter on the substantial
decrease in the participation rates of members of the popu-
lation with low educational attainment may be of some use.
The section concerning the utilization of time periods in
the discussion of question (1) may also prove useful. It
is perhaps prudent to wonder if 1957 is the proper year
to choose for a base in the study of unemployment and labor
force participation rates, given the differences in the
change in structure between the periods 1950-1960, 1952-
1962 and the period 1957-1962.

Summary

This chapter is divided into three major sections. In the first section, changes in the occupational structure during the postwar period analyzed in Chapters II and III are related to the levels of educational attainment associated with the occupational classes. Since changes in the structure of the demand for labor by educational class are indicated, the second section of this chapter examines labor market adjustment. A study of unemployment and participation rates by educational class shows that between 1950 and 1962 there has been an increase in structural disadvantage for those with low educational attainment. In the third section, this finding is put in the context of the recent debate over structural unemployment.

The findings in the first part of this chapter lead to the conclusion that the occupational structure shifted during the postwar period toward those occupations that have historically required or utilized personnel with relatively high levels of educational attainment. Associations made in Charts IV-A and IV-B indicate that those occupational classes that tended to grow more rapidly during the postwar period also tended to employ better educated workers. Since the occupations with higher rates of part-time employment have been those with low median educational levels, the change in the employment structure becomes more pronounced

when occupational employment is converted into employees
working at the national average of hours per week, as seen
in Chart IV-B. Four limitations of this analysis were
discussed: (1) the cyclical effect, (2) the level of
generalization, (3) the measurement of educational attain-
ment, and (4) the possibility of educational redundancy.
It was not possible to determine to what extent these limi-
tations affected the analysis, but the findings of the fol-
lowing section were consonant with what would have been ex-
pected, given the assumption that the limitations mentioned
above did not seriously impair the validity of the associa-
tions made between educational attainment and changes in
employment.

In the second section of this chapter, the question of
whether those with low levels of educational attainment had
suffered an increase in their disadvantage was raised.
Quality improvements in the labor supply as measured by
increases in the median level of educational attainment
were noted, and a discussion of labor market adjustment was
begun. Several difficulties in the use of unemployment and
participation rates as a test of labor market adjustment were
enumerated. The changes in labor force participation and
unemployment rates by classes of educational attainment were
examined for groups varying in age, sex, and color. Change
in structure was measured by change over time of class rate/
total rate. The finding of this section was that, if the
period 1950-62 was considered, members of the population with

low levels of educational attainment experienced a decline in their structural position as measured both by changes in unemployment and participation rates. This decline occurred even when periods of roughly equal economic activity were considered. This brought the scope of the analysis into one of the most serious economic controversies of the 1960's.

In the third section of this chapter the debate over structural unemployment was divided into three principal questions. The first question, whether structural unemployment as measured by class unemployment/total unemployment had increased since 1957, has been definitely answered in the negative by many economists and this thesis in no way casts doubt upon their findings.

The second question, whether the shift in the employment structure has made it more difficult during the period 1948-62 under the given demand conditions for members of the population with low educational attainment to obtain employment, was discussed at some length. The necessity for considering participation rates as well as unemployment rates for determining the relative position of an educational class, as measured by class rate/total rate was stressed. Some reflections were made on the proper time period to utilize for such a study. If only the period since 1957 is considered, there is little change to be found in the relative structural condition of unemployment rates between 1957

and 1962. It is for this reason that those economists who concluded that there had been no worsening of structural conditions were correct. However, an analysis which includes participation rates indicates that the position of those with low levels of educational attainment may have continued to decline in relative position since 1957. If the periods 1950 to 1960 or 1952 to 1962 are considered, those with low educational attainment suffered increased disadvantage in their structural position as measured by both unemployment and participation rates.

The third question, whether changes in the structural nature of unemployment have made it more difficult to return to the "full" employment-unemployment level of 4 percent was held to be unanswerable in this thesis. The finding that the _volume_ of structural unemployment as measured by class unemployment/total unemployment has not increased since 1957, and that increased structural difficulties were therefore not the cause of the increase in the level of unemployment between 1957 and 1962 (question (1)) does not adequately answer this third question. The focal point of interest of this chapter is the matching of the supply and demand of labor during the postwar period, given the changes in the occupational structure analyzed in previous chapters. During the course of the examination of change in structural difficulty by educational class, as measured by class unemployment rate/total unemployment rate and class participation rate/total participation rate, a pattern emerged of decreasing

labor force participation by those with low educational attainment. The participation rates of this group may be expected to increase as the rate of unemployment approaches the 4 percent level. The industrial and occupational structures will also shift as demand increases. Since the number of poorly educated potential workers is substantial, it is not possible to know how much a return toward full employment labor force participation rates will affect the structure of unemployment.

APPENDIX TO CHAPTER IV

Appendix IV-A

A note on whether years of educational attainment is an adequate measure of educational achievement or ability. Years of school completed is an inadequate measure of achievement. Theodore W. Schultz attempted to resolve this problem by adjusting years of school completed by the average number of days of school attendance. This is an important adjustment because a year of school in 1957 was approximately 60 percent longer than a year of schooling in 1900 (159 days versus 99 days).[1] He adopted a procedure developed by Clarence D. Long[2] for approximately equivalent years of education. The effect of this adjustment can be seen in Table IV-A-1 which gives years of education completed unadjusted, and adjusted for equivalent years.

Differences in the quality of schooling received in the same year further distort the measure of "median educational attainment." "One-Third of a Nation," a report by the President's Task Force on Manpower Conservation,[3] gave the

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[1] Theodore W. Schultz, "Rise in the Capital Stock Represented by Education in the United States, 1900-1957," in Economics of Higher Education, U.S. Department of Health, Education and Welfare, Office of Education (Washington, D C.: 1962), p. 97.

[2] The Labor Force Under Changing Income and Employment, op. cit., appendix F.

[3] President's Task Force on Manpower Conservation, "One-Third of a Nation" (Washington, D.C.: Government Printing Office, 1964).

Appendix Table IV-A-1

Years of Schooling Completed (Unadjusted and Adjusted to 1940 Equivalent Years) for the Labor Force 18-64 years of age: 1900-57

Year	Unadjusted Years of Schooling Completed Per Person	Equivalent 1940 Years of Schooling Completed Per Person
1900	7.70	4.14
1910	7.91	4.65
1920	8.12	5.25
1930	8.41	6.01
1940	9.02	7.24
1950	10.10	8.65
1957	10.96	10.45
Index 1957 (1900=100)	142	252

Source: Theodore W. Schultz, op. cit., p. 97.

results of a study which analyzed the men found unqualified for military service. In a sample of draft rejects studied by the U.S. Department of Labor, the median number of years of educational attainment was found to be 9.5. Twenty per cent of the rejects were high school graduates.[1] Any candidates scoring in the 10th and the 30th percentile are given additional screening, and some of the candidates in this group are rejected. A score of 10th percentile on the Armed Forces Qualification Test (AFQT) was estimated to indicate approximately fifth grade achievement; a score of 30th percentile, eighth grade achievement.[2] These ratings should be contrasted with the 9.5 median years of educational achievement of the draft rejects and with the fact that twenty percent of them graduated from high school.[3]

An analysis of the rates of rejection on mental grounds of the pre-induction draftees by state would seem to indicate that the quality of education is not everywhere the same. The rejection rate for Mississippi was 44.6 percent; for South Carolina, 46.8 percent; for Louisiana, 40.1 percent. In contrast the rate for Oregon was 3.7 percent; for

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[1] Ibid., p. 16.

[2] Ibid., p. 9.

[3] Ibid., p. 16.

Utah, 3.1 percent, for Washington, 2.6 percent.[1] A high
school graduate from South Carolina is not likely to have
the same educational achievement as his counterpart from
Washington. Yet for the purposes of the median educational
attainment level, they are equal.

The seriousness of the distortion which results in
the statistics for median educational attainment may be
seen from the magnitude of the numbers involved. Mental
failures accounted for 24.5 percent of draft rejections in
1962. 75,043 of 306,073 men examined were found to be un-
qualified for Army service.[2]

Another example of the disparity between educational
attainment and actual achievement is presented graphically
in Charts IV-A-1 and IV-A-2. The eighth grade students in
Forrestville North,[3] a predominately Negro grammar school
were given a nationally standardized reading test. In a
class of 749 students, 228, or 30 percent, scored below the
fifth grade level. The median score was at the sixth grade
level, or approximately two years below the level of the
students' educational attainment.

When Negroes enter college, the same disparity between
years of educational attainment and actual achievement measured
in learning prevails. In a study of Negro church-related

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[1]_Ibid._, p. A-6.

[2]_Ibid._, p. A-5.

[3]This study was received in personal correspondence with
Harold M. Barron, Director of the Research Department, The Chicago
Urban League.

colleges, it was found that only 48 percent of the 22,241
enrollees were at schools that met the minimum standards
of the regional accrediting association.[1] The linkage
between Negro primary and secondary education and achieve-
ment at the college level was described in a draft, "Pro-
gram for Negro Colleges."[2]

> Southern students enter the Negro college, how-
> ever, inadequately prepared for higher educa-
> tion. They come to the colleges from secondary
> schools that are understaffed, underequipped,
> and taught by men and women who have been them-
> selves the victims of the same system.[3]

> One-third or more of the entering class is
> likely to surrender its aspirations for higher
> education before the first term of the fresh-
> man year has been completed . . . . the presence
> in overwhelming numbers of unprepared students
> forces the Negro college to set its sights far
> lower than anything a college can honorably
> justify: the college to a large degree becomes
> a second high school, imparting the education
> the student should have received two or four
> or even six years earlier.[4]

Evidence that a B.A. or a B.S. after the name of an
alumnus of one of these schools does not fully qualify that
person for the work of a college graduate was reported by
Fred M. Hechinger.[5]

[1] Luther H. Foster and Charles E. Prothro, "Minimum In-
come Necessary to Maintain a Small Private College Effectively,"
The Journal of Negro Education, Vol. XXIX, No. 3, Summer,
1960, p. 346.

[2] Unpublished monograph prepared by Samuel M. Nabrit,
Stephen White, and Jerrold K. Zacharias, dated August 1, 1963.

[3] Ibid., p. 2.

[4] Ibid., p. 2

[5] "Mind Transfusion: Aid Project for Negro Professors
Shows Extent of Past Neglect," The New York Times, May 10,
1964, p. E-9, columns 1 and 2.

Appendix Table IV-A-2

Actual Reading Achievement in Forrestville North School

8th Grade Students: October-November, 1962

Reading Grade Level	No. of Students	% of Total	Cum. %
2.2-2.9	13	1.7	1.7
3.0-4.1	97	13.0	14.7
4.2-4.9	118	15.8	30.4
5.0-6.1	169	22.6	53.0
6.2-6.9	79	10.5	63.6
7.0-8.1	128	17.1	80.6
8.2-8.9	61	8.1	88.8
9.0-10.1	43	5.7	94.5
10.2-10.9	14	1.9	96.4
11.0-12.1	20	2.7	99.1
12.2-12.9	7	0.9	100.0

Source: Harold M. Baron, op. cit..

Appendix Charts IV-A-1 and IV-A-2

Distribution of Reading Levels of Eighth Grade Students: 1962

Forrestville North

Chart IV-A-1

Number of students

Chart IV-A-2

Cumulative %

median level

Grade level
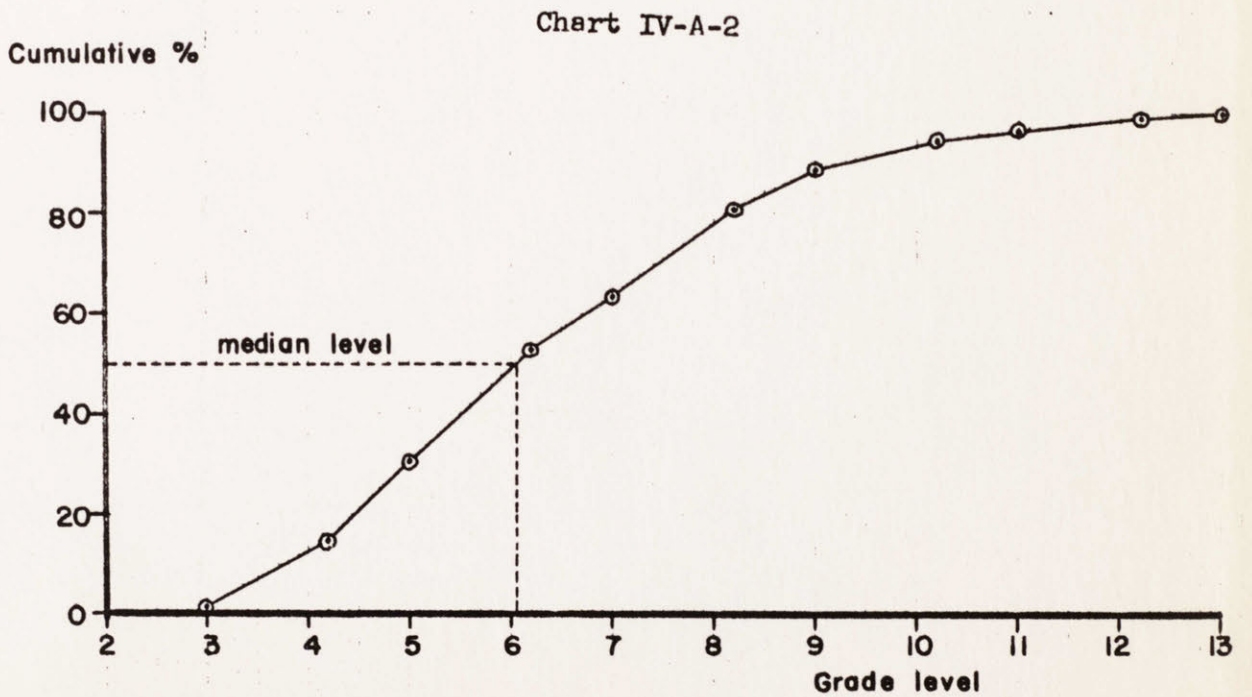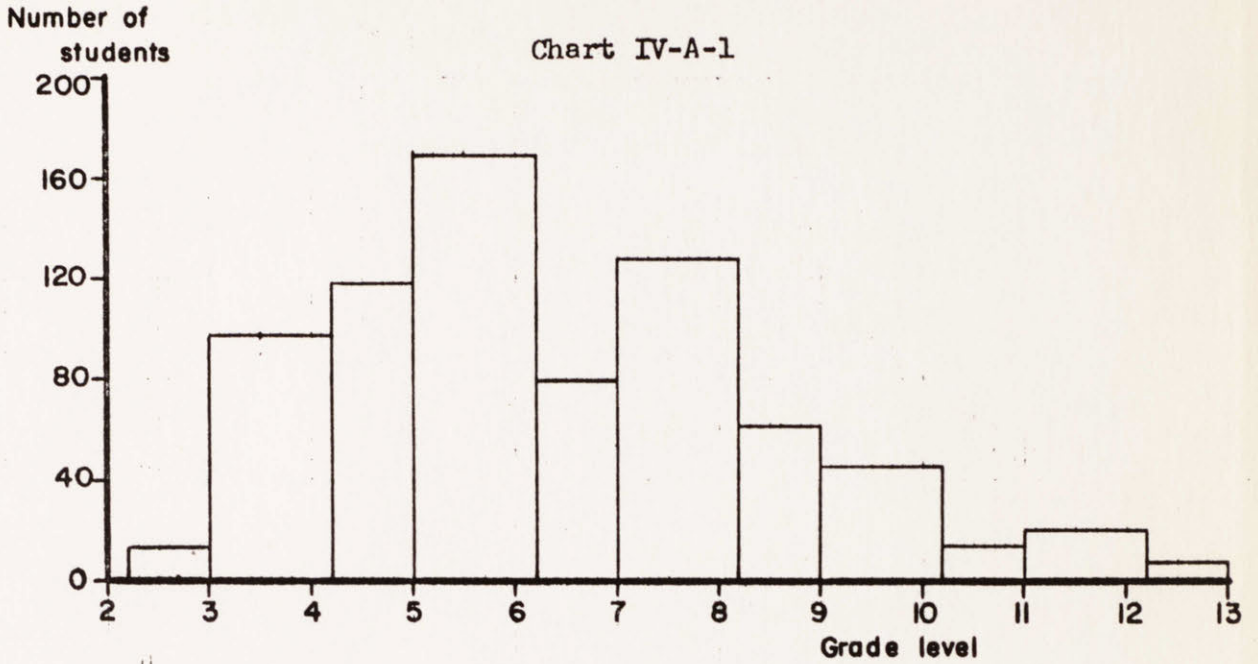
Source: Harold M. Baron, op. cit..

An analysis of results of the National
Teachers Examinations in North and South
Carolina a year ago showed that in the 36
predominately white colleges the proportion
of students scoring below 500 ranged from 0
to 31 percent of the students taking the test.
In the Negro colleges of these states, the
range for such unsatisfactory scores was from 59
to 97 percent. In many of these colleges, the
instruction is barely at the high school
level, largely because so much of the work
must be remedial.[1]

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[1]Idem.

APPENDIX IV-B-1

Appendix Table IV-B-1

Quarterly Changes in GNP for Selected Periods, Based on Year to Year Changes

(GNP in billions of 1954 dollars, not seasonally adjusted)

1948	1949	% Change	Quarter	1953	1954	% Change
69.2	78.1	1.3	I	89.2	87.2	-2.2
71.8	71.5	-0.4	II	93.0	89.7	-3.5
73.2	73.4	0.3	III	91.7	89.6	-2.3
78.9	77.7	-1.5	IV	95.2	96.8	1.7

1960	1961			1961	1962	
106.2	104.5	1.6	I	104.5	112.7	7.8
110.2	110.9	0.6	II	110.9	118.8	7.1
108.0	110.9	2.7	III	110.9	116.4	5.0
115.2	121.6	5.6	IV	121.6	128.3	5.5

Source: Quarterly GNP from:

U.S. Income and Output, op. cit., 1957, Table I-4,
    pp. 123-   for 1948-54.
Survey of Current Business (July 1964), Table 12,
    p. 14 for 1954-1963.

Quarterly Price Deflators from:
Survey of Current Business (July 1964), Table 6,
    p. 11 for 1959-63.
U.S. Income and Output, op. cit., 1957, Table VII-3,
    pp. 222-223 for 1948-54.

APPENDIX IV-C

Increases in the Quality of Education

Appendix Tables IV-C-1 and IV-C-2 present measures of improvement in the quality of the civilian population as measured by years of educational attainment. It can be seen from Table IV-C-1 that the proportion of the population 25 years of age and over with some college education increased from 10 percent in 1940 to over 16 percent in 1960.

Appendix Table IV-C-3 also presents a picture of the improvements in labor quality. In 1952, 24 percent of males between the ages of 20 and 24 had 8 years or less of education. By 1962 this percentage had been reduced to 12 percent. In 1952, 47 percent of the males aged 20 to 24 had not graduated from high school; by 1962 only 33 percent of this age bracket had not graduated from high school.

Appendix Table IV-C-1

Education of the Population, 25 Years and Over: 1960, 1950 and 1940

Percent Distribution

	Total: 25 years and over	None	Elementary School 1-4	Elementary School 5&6	7	8	High School 1-3	High School 4	College 1-3	College 4 or more
Conterminous United States*										
1960										
Total	100%	2.3	6.1	7.5	6.4	17.6	19.2	24.6	8.8	7.7
White	100	1.9	4.8	6.7	6.1	18.1	19.3	25.8	9.3	8.1
Nonwhite	100	5.5	18.0	14.7	8.9	12.8	18.8	13.4	4.4	3.5
1950										
Total	100	2.6	8.5	9.4	7.0	20.8	17.4	20.7	7.3	6.2
White	100	2.1	6.8	8.4	6.8	21.7	17.8	22.0	7.8	6.6
Nonwhite	100	6.8	25.8	18.7	9.6	11.9	13.5	8.4	3.0	2.2
1940										
Total	100	3.8	9.9	11.5	7.7	28.2	15.2	14.3	5.5	4.6
White	100	3.1	7.8	10.6	6.8	29.8	15.8	15.3	5.9	4.9
Nonwhite	100	10.5	31.3	21.5	8.4	11.9	8.7	4.5	1.9	1.3

Column group heading: Years of School Completed

*Excludes Hawaii and Alaska.

Source: Bureau of the Census, U.S. Department of Commerce, U.S. Census of Population: 1960, United States Summary; General Social and Economic Characteristics; Final Report PC(1)-1C. pp. I-207 to I-209, Table 76.(The 1940 and 1950 totals include not reporting on years of school completed. Percent based on total reporting.)

Education of the Civilian Population, Ages 20-24, by Sex

Percentage Distribution

	None	Grade School 1-4	5-7	8	≤ 8	High School 1-3	4	College 1-3	4+	Pop. of Segment (in 000's)	Median Years
Both Sexes											
March 1962	0.4	1.1	3.7	6.0	11.2	20.6	41.8	19.9	6.5	10,965	12.4
March 1959	0.4	1.7	4.8	6.9	13.8	20.2	42.1	17.3	5.8	10,242	12.4
March 1957	0.7	2.2	5.9	6.8	15.6	21.0	41.5	16.3	5.6	9,743	12.3
October 1952	0.7	2.4	7.2	8.7	18.1	21.9	38.5	13.7	6.4	9,298	12.2
Males Only											
March 1962	0.4	1.5	4.1	6.1	12.1	19.6	37.4	23.5	7.3	5,096	12.5
March 1959	0.5	2.0	5.8	8.1	16.4	19.1	36.5	20.1	6.6	4,757	12.4
March 1957	0.7	3.0	6.4	7.2	17.3	20.1	36.2	20.4	6.0	4,419	12.3
October 1952	1.3	3.7	8.8	10.5	24.3	22.8	29.5	14.6	8.1	3,732	12.1
Females Only											
March 1962	0.4	0.8	3.4	5.9	10.5	21.5	45.6	16.7	5.7	5,869	12.4
March 1959	0.3	1.5	3.9	5.8	11.5	21.2	46.9	14.9	4.9	5,485	12.4
March 1957	0.6	1.5	5.6	6.5	14.2	21.8	45.8	12.9	4.6	5,324	12.3
October 1952	0.4	1.6	6.1	7.5	15.6	21.3	44.5	13.1	5.2	5,566	12.3

Note: Based on years of school completed.

Source: U.S. Department of Commerce, Bureau of the Census, Current Population Reports: Population Characteristics, "School Enrollment, Educational Attainment, and Illiteracy, October 1952," Series P-20, No. 45, p. 18, Table 11. "Educational Attainment: March 1957," Series P-20, No. 77, p. 9, Table 1. "Literacy and Educational Attainment: March 1959," Series P-20, No. 99, p. 13, Table 1. "Educational Attainment: March 1962," Series P-20, No. 121, p. 7, Table 1.

APPENDIX IV-D

Technological Change Increases Employment?

The popular literature on automation and its effect on unemployment has reached flood proportions.[1] The literature has, in large part, been in the form of an argument as to whether automation and technological progress destroys jobs or creates employment. There are very firm advocates on both sides of the question. Professor Kendrick expressed his findings on the side of automation and job creation as follows when he correlated productivity increase with employment increases by industry for the period 1899 to 1953:

> On the average, the industry groupings of firms that increase their productivity efficiency relative to the economy average are able to reduce the prices of their products relative to the general price level and thereby gain an increasing share of the market . . . . Firms in the technologically more progressive industries have tended to increase their employment of labor and use of capital somewhat more than industry as a whole--a fact which contradicts the notion of 'technological unemployment' in any long run sense.[2]

In his testimony before the Joint Economic Committee on

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[1] See for example, the following articles that have appeared within a period of merely a few months. Peter Drucker, "Automation is not the Villain," New York Times Magazine (January 14, 1965); Edwin L. Dale, Jr., "The Great Unemployment Fallacy," The New Republic (September 5, 1964); "The Challenge of Automation," Newsweek (January 25, 1965); Charles E. Silberman, "The Real News About Automation," Fortune (January 1965).

[2] John Kendrick, op. cit., p. 189.

December 20, 1961, Professor Kendrick related his research

to the question of productivity increase and unemployment as

follows:

> Additional evidence that contradicts the notion
> of technological advance as the cause of in-
> creasing unemployment is to be found in an
> industry-by-industry analysis. During this
> century it has generally been the industries
> with the fastest rates of technological ad-
> vance, as reflected in the productivity gains,
> that have increased employment more than
> average. The more progressive industries have
> been able to reduce relative prices, and thus
> increase relative sales and output more than
> enough to offset the labor-saving effect of
> productivity advance.

> There have, of course, been exceptions to this
> tendency. In the last 25 years, for example,
> agriculture has been an industry with produc-
> tivity gains. But due to the low responsive-
> ness of demand to relative price reductions and
> to industry increases, employment has declined
> in this progressive industry. Conversely, the
> service area of the economy has increased pro-
> ductivity at a less than average rate; but due
> to a low responsiveness of consumers to rela-
> tive price rises in this area, and the tendency
> to spend an increasing proportion of rising in-
> comes on services, employment has risen rela-
> tively, despite the lack of technological pro-
> gress. But these cases are more than outweighed
> by the many progressive areas that have increased
> both employment of labor and absorption of capi-
> tal more than the economy at large, while the
> technically backward industries have generally
> lost ground.[1]

Professor Kendrick derived his findings from his corre-

lations of productivity increase and employment for 33 in-

dustrial groups and a set of 80 more finely defined manufac-

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[1]Employment and Unemployment, op. cit., pp. 342-343.

turing industries. He had a positive correlation for the period 1899 to 1953 of 0.32, significant at the .05 level for the group of 33 industries.[1] This finding conflicts with the analysis in Chapter II of this thesis where it was found that there was a negative correlation between productivity increases and relative changes in employment. The interest in Chapter II was in changes between major sectors of the economy in contrast to the work of Professor Kendrick that concentrated in manufacturing. The reasoning behind the broader interest in this thesis was that there was a relationship between the major industrial sectors of the economy and occupational employment.

It is difficult to understand how Professor Kendrick reached his conclusions. Since his research was devoted primarily to manufacturing, his conclusions go beyond the scope of his findings. The research in this thesis has indicated that those sectors of the economy with more rapid increases in productivity have lost in share of total employment. This does not necessarily mean that the jobs have been destroyed; it does mean that the employment in sectors with more rapid increases in productivity has not risen as rapidly as in the other sectors. It was also found that there has been a shift within sectors—away from blue collar employment and toward white collar employment.

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[1] John Kendrick, op. cit., p. 216.

Professor Kendrick's _own_ research on manufacturing pro-
ductivity does not support his conclusions. Although he did
get a significant positive correlation between productivity
and employment increases for the period 1899 to 1953 for 33
major industries and for 80 manufacturing industries for the
period 1899 to 1954, his correlations for the second half
of his long period give a very different picture. For the
period 1948 to 1953 for his 33 industries, there was a corre-
lation of 0.19, not significant at the 0.05 level. For
the period 1937 to 1948, there was a correlation -0.19,
also not significant at the 0.05 level. Kendrick's re-
ported correlations for the 80 manufacturing industries was
-0.19 (a reversal of sign) for the period 1937-48 and -0.12
for the period 1948-54.[1] Neither of these two correlations
was significant.

Professor Kendrick concluded his section where he re-
ported these correlation results as follows:

> Apparently, the theoretical propositions that
> prices tend to equal unit cost and that indus-
> tries with declining relative unit costs tend
> to enjoy increases in relative demand and out-
> put describe the operations of the real econ-
> omy aptly if a rather long period is allowed
> for the adjustments to take place.

The conclusions reached by Professor Kendrick were found

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[1]_Ibid._, p. 216.

to be incorrect by Ewan Clague and Leon Greenberg.[1] In

a recent study of the period 1929 to 1961, Victor R. Fuchs[2]

found a negative rank correlation of -0.86, significant at

the 0.01 level between increases in output per manhour and

increases in employment in the ten major sectors of the

economy analyzed in Chapter II of this thesis. In the

finer SIC 2-digit industries in manufacturing, it was

demonstrated in Chart II-H that there was not a positive

correlation between increases in productivity and in-

creases in employment during the period 1948-63.

Professor Kendrick may be correct in the long run for

manufacturing industries. When making an analysis about a

short-run phenomenon such as the rising rate of unemploy-

ment in the latter part of the postwar period, it may not

be correct to attribute a deviation in the more recent half

of a long period to a short-run phenomenon which will be

adjusted in the long-run if one only waits long enough.

The fact that Professor Kendrick was not correct in

his specific conclusions does not mean that technological

changes destroy jobs. It does mean that technological

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[1]Ewan Clague and Leon Greengerg, "Employment" in
Automation and Technological Change, America Assembly,
Columbia University (Englewood, N.J.: Prentice-Hall, Inc.,
1962), p. 121.

[2]Victor R. Fuchs, "Productivity Trends in the Goods
and Service Sectors, 1929-61," Occasional Paper No. 89 (New
York: National Bureau of Economic Research, 1964), p. 17.

change restructures employment and that a society must

anticipate the need for assistance with the adjustments.

If Professor Kendrick had been correct, there would be

little need to be concerned about the restructuring of the

labor force.

CHAPTER V

SUMMARY AND CONCLUSIONS

Political Economy <u>n</u> 1: an 18th-century branch
of the art of government concerned with direc-
ting governmental policies toward the promo-
tion of the wealth of the government and com-
munity as a whole. 2a: a 19th-century social
science comprising the modern science of eco-
nomics but concerned principally with govern-
mental as contrasted with commercial or per-
sonal business. b: a modern social science
dealing with the interrelationship of political
and economic processes.[1]

Public interest in the smooth functioning of labor

markets has resulted in the Manpower Development and Training

Act of 1962, the Vocational Education Act of 1963, the Employ-

ment Opportunity Act of 1964 and the current effort to ob-

tain federal funds for education. Much of this effort has

stemmed from an awareness on the part of the public that

there is a relationship between educational attainment and

preparation for employment. It has also been recognized

that the structure of employment has been moving clearly

in the direction of occupations that require more educa-

tional attainment.

This study has attempted to quantify the relationships

between changes in occupational employment and the level of

educational attainment associated with the changing occu-

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[1] Webster's Third International Dictionary, (Springfield,
Mass.: G. & C. Merriam Company, 1963), p. 1755.

pational structure. The postwar shift in the occupational structure, it was hypothesized, was in part due to differential rates of productivity change, and thus the study has attempted to trace the path from the structure of productivity change by industrial sector through to occupational changes and from there to the level of educational attainment associated with the occupations. The last phase of this analysis was an attempt to ascertain whether or not the labor supply had adjusted rapidly enough to the changes in the industrial and occupational structures to avoid an increase in structural difficulties in the matching of labor supply and demand.

It should be emphasized that this thesis is essentially historical in nature. It treats the relationships between a certain set of variables during the postwar period. The kernal of popular belief behind this set of variables is the often expressed fear that automation, or productivity increase, has reduced the employment opportunities of the relatively unskilled. Such a direct causal relationship may not, of course, be inferred from the results of this study, because it is impossible to know what would have been the experience of the postwar period if the level of aggregate demand had been high enough to sustain full employment.

The presentation of the findings of this thesis will follow the path of relationships that were hypothesized above. The last stage, that of the adjustment of the labor supply, will be used to relate the findings of the study to the objectives of public policy and the need for further work on the set of relationships that have been investigated here.

Productivity and Changes in the Industrial Structure

The rate of labor productivity increase in the private economy has been faster in the postwar period than in the long period 1899-1948. This finding was related to the fact that the faster the rate of productivity increase, the faster must be the rate of growth in output if a given level of employment input is to be employed. Since increases in the aggregate rate of productivity can result from changes in the structure of employment, it was also observed that the faster rate of productivity increase might be a result of a faster rate of change in the industrial structure of employment. As this question was to be analyzed subsequently, the next stage of research was to relate the employment changes by industrial sector with the rate of productivity increase of the industrial sectors.

It was also found that those industrial sectors with the faster increases in productivity had smaller increases in employment than those sectors with slower increases in

productivity. This pattern was true for both the period 1948 to 1957 and the period 1957 to 1962 as well as for the total period under investigation, 1948 to 1962. The limitations of this analysis were then enumerated. A major weakness in any use of real output by industrial sector is the differences in the quality of deflators. A second weakness of this analysis was the level of aggregation. The possibility was raised that in an industrial sector, such as manufacturing, the industries with the faster increases in productivity were the ones that had had more rapid increases in employment. Since the primary concern of this study was in the occupational structure of the labor force, it was not considered necessary to examine the internal experience of the major industrial sectors. Because there were other studies that had attempted to relate changes in productivity with changes in employment,[1] the possibility that there had been changes over time in the relationship between productivity, prices, output and employment increases was raised. The changes between the long run and more recent periods in the findings of John Kendrick and the calculations done in this thesis for the manufacturing sector for the period 1948-63 were given as evidence that during the postwar period a new set of relationships may have developed that are different from the ones found for earlier periods

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[1] John Kendrick, loc. cit. and W. E G. Salter, loc. cit.

by Kendrick and Salter.

The sectors with the slower increases in productivity were the nongoods sectors; these sectors increased in proportion of total employment. This finding was compatible with the popular belief that productivity increases reduce employment opportunities. It was pointed out that these findings indicate that productivity increases have to some degree affected the distribution of total employment, but that the level of total employment is largely a function of aggregate demand. The level of aggregate demand also affects the distribution of employment in the industrial structure.

Changes in the Employment Structure

It was found that during the postwar period the industrial structure was evolving away from the goods producing sectors more rapidly than had been the case in the long period 1899 to 1948. Part of the rapidity of change could be explained by the slow level of growth between 1957 and 1962, and it was observed that one could not extrapolate these trends into the future. In addition to the fact that the rate of change was faster than was the historical experience of the twentieth century, it was found that the consistency of change from goods to nongoods was also unusual. Agriculture declined rapidly in importance during all of this century, but a sizeable part of this decrease before the

postwar period was absorbed by the goods producing sector
of manufacturing.   During the postwar period, even manu-
facturing lost in its share of total employment.

The relationship between the change from goods to non-
goods and the shift from blue to white collar employment
was also established.   It was found that 40 percent of
the change from blue collar to white collar employment
that occurred during the period 1948 to 1962 could be ex-
plained by the shift from goods to non-goods employment.
This calculation excluded service workers because of the
very mixed nature of the service industry.   The reason that
the shift in industrial structure had such an impact on
the occupational structure was the fact that blue collar
occupations predominate in the goods producing sectors and
white collar occupations predominate in the non-goods sectors.

The historical experience of the occupational structure
was similar to what occurred in the industrial structure.
The shift away from blue collar employment was faster and
more consistent between 1950 and 1962 than it was in the
long period 1900 to 1950.   The relationship between the
industrial and occupational structure was made manifest
through the finding that the consistency in the shift from
the goods sector could be traced to the consistency in the
shift away from blue collar employment.   During the long
period 1899-48, there was an increase in the proportion of
total industrial employment in the manufacturing sector.

There was also an increase between 1900 and 1950 in the pro-
portion of total occupational employment held by two of the
blue collar occupations, craftsmen, foremen and operatives,
that predominate in the manufacturing sector. During the
postwar period, between 1948 and 1962 there was a decrease
in the proportion of industrial employment held by the
manufacturing sector; there was also a decrease in the
proportion of occupational employment held by craftsmen
and foremen and operatives.

Educational Attainment and Employment, Unemployment and Labor Force Participation

The analysis here was divided into three major parts.
The relationship between changes in the structure of em-
ployment and educational attainment was analyzed in the
first section. In the second section, an attempt was made
to determine the effect on the labor force of the changes
in the structure of employment. The third section of this
chapter related the findings of this thesis to the debate
over whether structural unemployment had worsened during
the postwar period.

Employment Changes and Educational Attainment

When changes in occupational employment between 1948 and 1962 were related to the median educational attainment of the occupations, it was discovered that those occupations that have tended to have personnel with higher levels of educational attainment have been increasing the most rapidly. It was also found that those occupations with low levels of educational attainment have tended to have high proportions of part-time employment. When part-time employment for economic reasons was considered, the relationship between part-time employment and low levels of educational attainment became better defined. When changes in employment were adjusted for part-time proportions in order to obtain full-time equivalents of employment, the association made between increase in employment and educational attainment became more significant. The higher the level of median educational attainment in an occupation, the larger tended to be the increase in employment during the postwar period.

The findings in this section were subject to a number of limitations. For example, how much educational attainment actually prepares for employment and how much it is redundant are questions for which there are no clear-cut answers. A major limitation of this study was the use of educational attainment as a measure of job qualification. It may well be that educational attainment also measures personal characteristics such as energy, emotional stability

and degree of socialization, as well. As used in this
thesis, it has been accepted that years of educational at-
tainment may mean all of these things. Another problem
with the use of educational attainment to study structural
difficulty is that, since on the average nonwhites and
older workers have less educational attainment, educational
attainment in its broadest aggregation can be a very mis-
leading instrument of measurement. In a number of cases,
structural changes of such groups as white males 35 to 44
years of age were used in order to avoid the aggregation
limitation.

Educational Attainment and Structural Difficulties in the Labor Force

Two trends related to educational attainment and em-
ployment could be observed during the postwar period. One
was the finding that there was a rapid shift toward white
collar employment where educational attainment tended to be
higher than in blue collar employment. The second trend
was the rapid increase in the educational attainment levels
in the labor force. During the latter part of the
postwar period, aggregate demand was insufficient to main-
tain a level of full employment (unemployment of 4 percent).
There were, therefore, three major changes in the parameters
under which members of the population sought employment:
(1) the shift in the occupational structure toward those

occupations that have required higher levels of educational attainment; (2) a shift toward an increase in the average educational attainment in the population; and (3) a decrease in the level of aggregate demand relative to the number of people seeking employment with a resultant increase in the rate of unemployment.[1]

This thesis was conceived as an investigation of the evidence behind the popular belief that postwar productivity increases restructured the labor force in such a way that the poorly educated found it more difficult to obtain employment. The last stage of the test of this belief again gave some justification for it. It was found in Chapter IV that it was, in fact, more difficult for members of the population with low levels of educational attainment to obtain employment in the latter part of the postwar period than in the earlier part of this period.

It is important to recognize that the postwar increase in the disadvantage of the poorly educated describes what happened during a period of given demand which did not maintain a "full" employment-unemployment level. The findings in this thesis do provide a statistically sound historical example of the association between increases in productivity

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[1] There have been some doubts expressed about whether the higher rate of unemployment was a result of inadequate demand or a result of structural imperfections in the labor force. This question will be discussed in the following section.

and deterioration of the relative position of the poorly
educated. That has had wide public acceptance. A summary
of the findings will make manifest the accuracy of the belief,
which has had wide public acceptance, that the poorly
educated suffered relatively during the postwar period. How-
ever, it must again be emphasized that it is not possible
to know what might have happened if high levels of aggre-
gate demand had been maintained throughout the postwar
period. Increases in productivity are not necessarily the
cause of increases in the disadvantage of those with low
educational attainment. Between 1950 and 1962, the structural
disadvantage of those with low levels of educational attain-
ment as measured by levels of unemployment and labor force
participation rates became more serious. The total rate of
unemployment rose above 4 percent which has been the rate
considered by the Kennedy and Johnson Council of Economic
Advisors as the "full" employment rate of unemployment,
and yet there is not a significant difference between the
"full" employment-unemployment structure of 1957 and the
unemployment structure in the year of excessive unemployment,
1962. It can therefore be hypothesized that the rate of
increase in aggregate demand was too slow to maintain a "full"
employment economy and that inadequate demand combined with
the shifts in industrial and occupational structures and at
least an adequate increase in the quality of the labor force
led to an increase in the structural disadvantage of those
with low levels of educational attainment.

What part of the increase in structural difficulty was
a result of slow growth? What part was a result of the improve-
ment of the quality of the labor force? What part was a re-
sult of the shifts in the industrial and occupational
structures? The interesting division of the causes of the
increase in structural disadvantage of those with low levels
of educational attainment was not attempted; it was only
possible to make manifest the importance of each of these
factors.

In order to know the causes of the increased structural
disadvantage, it is necessary to understand the relation-
ships between the following variables: (1) the relative
supply in the labor force of the various classes of edu-
cational attainment; (2) the degree to which the change
in the employment structure really increased the average
educational requirements for labor; (3) the relative
productivity of workers with high and low levels of edu-
cational attainment compared with their relative wage
levels; and (4) the impact on the output structure of the
slow level of growth in GNP that occurred. It can be seen
that these questions cannot be answered, due in large part
to insufficient information. It was possible to select
periods of roughly equivalent economic activity as measured
by the level of unemployment and demonstrate that there
had been a significant worsening in the structural disad-
vantage between the earlier and later periods. This would

suggest that the change in the structure of employment and the change in the quality of the labor force should be given considerable weight in a study of the causes of the worsening position of those with low levels of education.

In the discussion of the use of changes in labor force participation and unemployment rates by educational class as a measure of structural change, it was necessary to enumerate the dangers that were inherent in this type of analysis. Due to definitional problems, it was shown that it was safer to concentrate on the structure of unemployment and labor force participation by educational class rather than by industrial or occupational class. It was also suggested that it was necessary to consider a combination of unemployment and labor force participation rates because of the magnitude of difference a few percentage points in labor force participation rates can have on the class rate of unemployment. The level of economic activity was another factor for consideration, as it might be misleading to compare the unemployment experience of the recessions of 1949 and 1954 when GNP was declining and members of the labor force were being laid off with the experience of a year such as 1962 when the economy was growing rapidly and the problem was not a _decline_ in GNP, but merely too slow a growth rate in output since 1955. The importance of using both the labor force unemployment and participation rates was emphasized when 1962 was compared

with 1949. Here were two periods of approximately equal
unemployment rates, but 1962 was the seventh year of sub-
stantial GNP "gap" in the economy. It is small wonder
that members of the labor force stopped participating over
such a long period - in contrast to the sharp recession
experience of 1949 when the level of unemployment rose
from 3.8 percent in 1948 to 5.9 percent in 1949.[1]

The conclusion was that there had been an increase
in the structural disadvantage of the poorly educated be-
tween 1950 and 1962. It was discovered that during that
period labor force participation rates tended to rise for
the better educated and tended to fall for the poorly
educated. Levels of economic activity as measured by the
rate of unemployment were roughly comparable, and yet the
level of unemployment of the better educated tended to
fall relative to the level of unemployment of the poorly
educated -- despite the great decrease in labor force par-
ticipation rates of the poorly educated that reduced the re-
ported unemployment rates of that class. There is a vast
number of possible permutations of labor force classes.
The findings in this analysis were based upon a number of
meaningful observations.

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[1]Manpower Rpeort of the President, 1964, op. cit., p. 195.

The weight of the evidence was impressive. Between 1950 and 1962, there was a decrease in the relative position of members of the population with low levels of education as measured by changes in labor force participation and unemployment rates. Whatever the attributes that employers find useful that are associated with years of education, it could be seen that years of educational attainment had great predictive power as far as what happened between the period 1950 and 1962. When the labor force was divided into small classes of educational attainment, it was seen that even one or two extra years of education made a difference. Members of the population with 8 years fared better than members of the population with 5-7 years who fared better than those with 1-4 years. This finding was for the "purest" form of structural test: white males of prime working age. It was the "purest" test because this class of the population was not an aggregation of several easily identifiable sub-classes such as females, nonwhites, the aged, or teenagers. This "pure" test was conducted on two periods of approximately equal economic activity as measured by total rates of unemployment which has been one of the requirements for a test of change in structural unemployment.

The Debate Over Whether Structural Unemployment Has Worsened

The public has believed in a causal relationship for the sequence of events analyzed in this thesis. The conclusion of this study is that it is possible to find statistical evidence that the sequence from productivity through to a growing inability of the poorly educated to secure employment did in fact occur during the postwar period. The question of causality has, of course, not been answered. It is interesting to observe that, on balance, the economics profession has found that there has been no increase in structural unemployment. The conflict between the public and the economics profession led Edwin L. Dale, Jr. to write:

> It seems to this reporter after countless conversations with informed Americans—from intellectuals through bankers—that the country is gripped by a set of fallacies about the main problem of our economy and perhaps of our society—unemployment.
>
> So deep is the conventional wisdom, and so pervasive through the right-to-left spectrum, that neither I nor anyone else has much hope of shaking it. But perhaps a try is worthwhile. Significantly, the one group that least accepts the conventional view is the economists, though they are not unanimous.[1]

It can be concluded that both sides of the debate over structural unemployment are correct, but the argument resulted from a failure to properly specify the questions that

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[1] Dales, op. cit., p. 10.

were to be considered. Three questions were specified in

Chapter IV, and it was found that the statistical evidence

gathered by the economists who found that there had been

no increase in structural unemployment could definitively

answer only one of the questions despite the fact that the

weight of evidence presented led N. J. Simler to begin his

recent article on the worsening of structural unemployment

with an apology for "subjecting an apparently dead horse to

one last thumping."[1] Before discussing the parts of this

thesis that are related to the debate over structural unem-

ployment, it will be useful to specify the questions that

have been of interest in the public debate that has waxed

so fiercely during the past four or five years.

(1) Have increases in the structural nature of
unemployment since 1957 been the cause of
the rise in the total rate of unemployment
from the "full" employment-unemployment
level of 4 percent?

(2) Have "automation" and other causes of the
shift in the requirements of skills in the
labor force made it more difficult for mem-
bers of the population with low skill at-
tainment to obtain employment?

(3) Have changes in the structural nature of
unemployment made it more difficult to re-
turn through the use of increased aggre-
gative demand to the "full" employment-un-
employment level that was experienced from
1955-57?

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[1]N. J. Simler, op. cit., p. 985.

The answer to the first question could be given fairly definitively. The proportion of total unemployment held by the structurally disadvantaged classes declined between 1957 and 1960 or 1962, and the higher unemployment rates after 1957 could not, therefore, be attributed to increases in structural unemployment.

The answer to the second question could not be given so definitively. There was statistical evidence for the sequence from productivity increases to structural changes in employment to increases in the disadvantage of the poorly educated during the postwar period. However, how much of the decline in the position of the poorly educated could be attributed to productivity increases, and how much could be attributed to inadequate aggregate demand and increases in the average educational attainment of the labor force was a question that this thesis did not attempt to answer. It was possible to compare two periods of approximately equal economic activity, 1950 and 1959, and find a worsening of the structural problem in the later period. This added degree of analytical sophistication is, however, no substitute for the actual experience of an increase in demand.

The third question was held to be unanswerable because of the fact that increases in aggregate demand and consequent decreases in the rate of unemployment might be expected to bring back into the labor force many of the members of the population who were not in the labor force because of the

inadequate level of demand. Since a substantial proportion of those returning to the labor force would be of people with low levels of educational attainment and a relatively high propensity to be unemployed, it was concluded that it was not possible to predict what would happen to the unemployment rate if these workers returned to the labor force.

Economic Analysis and Public Policy

The economic policies of the Kennedy and Johnson administrations have been directed, in large part, to a closing of the gap between actual GNP and potential GNP. A critical variable in the determination of the size of the immediate gap is the magnitude of the size of the labor surplus that would be available and qualified to work if aggregate demand could be increased sufficiently to result in their employment. There has been a debate in the literature over the size of the true labor gap, and two conflicting conclusions have been reached about the usefulness of the level of unemployment as a true measure of the gap. It has been found that the level of unemployment hides the true gap because workers have left the labor force because of inadequate demand. On the other hand, it has been found that the reported level of unemployment is too optimistic a measure of the gap because the workers who left the labor

force did so because they were unqualified for employment and a larger proportion of the remaining unemployed workers in the latter part of the postwar period were also unqualified than was the case formerly. It has been found in this thesis that the proportion of the unemployed that are structurally disadvantaged has not increased during the postwar period. What is not known is the true magnitude of the available labor supply given the phenomenon of a falling labor force participation rate for the population with low levels of educational attainment.

The available statistics and the experience of the postwar period are inadequate for the test of two of the key questions that have been raised in the debate over whether structural unemployment has worsened. The first of these questions is whether it was as easy in 1960 or 1962 to return to a 4 percent level of unemployment as it was in the recession years of 1950 or 1954 solely through the use of increased aggregate demand. To answer this question would mean that information about the behavior of labor force participation rates of the relatively unskilled would have to be considered. This information is not available.

A second question that also cannot be answered is whether the increase in structural disadvantage (measured by the class rate/total rate ratio of both unemployment and labor force participation rates) can be made to disappear

as easily in the latter part of the postwar period as it was in the early parts of the postwar period through increases in aggregate demand.

These are two very different questions, although it is easy to lump them together and thereby miss the important difference. It is possible that the first question may be answered affirmatively and the second question negatively. There was slow growth in the economy from 1955 through 1960. The rapid increase in the number of highly qualified workers during that period meant that those with low levels of educational attainment lost ground, especially if labor force participation rates are considered. It is possible that these workers who dropped out of the labor force will, in large measure, never return and that it will therefore be as easy to return to a 4 percent level of unemployment in the 1960's as it was in the earlier parts of the postwar period.[1] If this is accepted as the most probable answer to the first question, then it is necessary to accept the fact that members of the population with low levels of education will tend to remain out of the labor force in greater numbers than would be expected from their sex and age brackets. Thus their worsened structural disadvantage would continue.

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[1]This does not consider the increase in the unemployment of women and teenagers who have created new problems in 1964 and 1965.

Much of the vast volume of literature on whether
structural unemployment has worsened has mixed two dif-
ferent questions. The January 1965 <u>Annual Report</u> of the
Council of Economic Advisors has very substantially
shifted from emphasis on inadequate demand toward an in-
terest in activities that will lessen the problem of
structural disadvantage. The Economic Opportunity Act
of 1964 and the proposed federal aid to education bills
before Congress will both contribute to facilitating the
adjustment of the labor force in the change in the struc-
ture of employment that was analyzed in this study.

The findings here should make more meaningful the
statistics on lack of educational attainment that a large
proportion of the population experiences. Of the 3 million
students who could have graduated from high school in 1962,
1.1 million dropped out somewhere before graduation.[1] In
the population between the ages of 20 and 24 in March 1962,
over 10 percent of the population had 8 years or less of
educational attainment; over 30 percent did not finish
high school.[2]

New standards have been set for the performance of
the U.S. economy. Government activity is to be initiated
when there is a gap between potential and actual GNP -- not

[1]Table I-A.
[2] Appendix A to Chapter IV.

only when the country is heading toward a recession. It is
easier to measure declines in GNP than it is to quantify
the GNP gap, and further research on the availability of
labor and the structure of job openings will clearly be
useful. The recognition of the problem of labor force drop-
outs should result in increased attention to the reasons why
people give up and the methods through which they can be
rehabilitated. There is very little known about these
considerations at this time. If it is true that education
or training is more important for employment today than it
was earlier in the postwar period, then research on the
fucntioning of vocational education will be necessary.[1]
This thesis has reached a set of conclusions that lead to
an awareness that there is inadequate knowledge about some
of the important problems in the economy of the 1960's.

It can be concluded from this analysis that the struc-
ture of employment has moved rapidly during the postwar
period toward those occupations that are associated with
higher educational attainment. An analysis of the combination
of unemployment and labor force participation rates indicates
that during the postwar period there has been a very definite
worsening of the structural disadvantage of the poorly
educated. As the proportion of the poorly educated decreases,
this disadvantage may tend to disappear, since the supply

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[1]See, for example, Fred M. Hechinger's review of the
problem of vocational education in The New York Times
(April 4, 1965), p. E 9.

of workers willing to do menial tasks may decrease faster
than the decreases in the demand for such workers. It is
not possible to extrapolate far into the future from the
findings in this thesis, but in looking back over the
period from 1948 to 1962 analyzed here, it is possible to
join with Theodore W. Schultz in concluding that education-
al attainment is of greater importance today because it
facilitates adjustment to structural change.

> Schooling increases the capability of
> people to adjust to changes in job opportunities
> associated with economic growth. When an es-
> tablished worker faces such adjustment, he may
> have to leave his present occupation and enter
> upon another, and he may also have to migrate
> out of a declining sector to one with better job
> opportunities. The large movement of people
> out of agriculture, made necessary because of
> the rapid rise in the productivity of labor in
> farming and because of the slow increase in the
> demand for farm products, dramatizes the impor-
> tance of these adjustments. Under widely dif-
> ferent circumstances, it is true that individuals
> with 8 years of elementary schooling are better
> prepared to move and enter upon new jobs than
> are those who have had only 4 or less years of
> schooling. Likewise, those with a high school
> education are much better prepared to make
> such adjustments than are those who have com-
> pleted no more than the elementary grades.
>
> Economic growth, under modern conditions, brings
> about vast changes in job opportunities. School-
> ing in this connection is valuable because it is
> a source of flexibility in making these occupa-
> tional and spatial adjustments.[1]

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[1]*The Economic Value of Education* (New York: Columbia
University Press, 1963), pp. 40-41.

Appendix A-1

Index of Output per Man-Hour in the Total Private Economy, 1909-1963

(1909 = 100)

YEAR	INDEX	YEAR	INDEX
1909	100.0	1937	152.3
1910	100.0	1938	156.9
1911	100.6	1939	163.0
1912	103.4	1940	170.8
1913	103.6	1941	180.5
1914	100.2	1942	182.1
1915	100.4	1943	184.9
1916	101.3	1944	197.5
1917	98.1	1945	206.9
1918	102.3	1946	201.7
1919	110.1	1947	203.1
1920	104.8	1948	210.3
1921	106.1	1949	216.4
1922	116.0	1950	231.9
1923	121.4	1951	237.6
1924	123.7	1952	242.9
1925	130.0	1953	252.7
1926	133.0	1954	257.1
1927	133.4	1955	268.9
1928	133.0	1956	269.1
1929	138.2	1957	278.6
1930	132.8	1958	285.5
1931	133.4	1959	296.0
1932	126.3	1960	301.9
1933	122.9	1961	312.2
1934	136.1	1962	325.0
1935	143.5	1963	336.4
1936	151.0		

Source: Years 1909 to 1947: U.S. Department of Labor, Bureau of Labor Statistics, "Trends in Output per Man-Hour in the Private Economy, 1909-1958," (Washington, D.C.: Government Printing Office, 1959), p. 17 & 18. Years 1948 to 1963: Economic Report of the President, 1964, (Washington, D.C.: Government Printing Office, 1964), p. 245. The man-hour series was used and converted to 1909 = 100 from 1947-49 = 100 in the earlier source and 1957-59 = 100 in the later source.

Note: Used establishement data, which is based upon man-hours paid for.

Appendix A-2

Output, Labor Input, and their Ratio by Industry: 1948, 1957, and 1962

Industry	1948			1957			1962		
	Output[1]	Labor[2]	Output/Labor[3]	Output	Labor	Output/Labor	Output	Labor	Output/Labor
1. Agriculture, Forestry, and Fisheries	20.1	7,012	2.867	21.5	5,470	3.931	22.9	4,823	5.748
2. Mining	8.9	1,021	8.717	11.2	858	13.054	11.2	673	16.642
3. Contract Construction	13.4	3,262	4.108	19.2	4,161	4.614	18.6	4,217	4.411
4. Manufacturing	86.0	15,468	5.560	117.8	17,054	6.907	134.1	16,663	8.048
5. Wholesale and Retail Trade	54.5	11,309	4.819	72.5	12,980	5.586	82.2	13,832	5.943
6. Finance, Insurance, and Real Estate	32.3	1,923	16.797	48.4	2,721	17.788	60.0	3,129	19.175
7. Transportation	17.1	3,000	5.700	20.7	2,846	7.273	22.9	2,557	8.956
8. Communications and Public Utilities	9.4	1,281	7.338	19.5	1,514	12.880	26.5	1,456	18.201
9. Services	29.4	7,500	3.920	39.5	9,052	4.364	48.1	10,271	4.683
10. Government (including military) and Government Enterprises	26.6	6,800	3.912	37.9	9,918	3.821	42.6	11,088	3.842

[1] GNP in 1954 dollars -- Billions of dollars

[2] Persons engaged in production -- Thousands of persons   [3] $1,000/person

Source

Output: Manpower Report of the President, 1963 (Washington, D.C.; Government Printing Office, 1963), Table G-4, p. 200; The Conference Board, The Economic Almanac, 1964, (New York: National Industrial Conference Board, 1964), p. 127. Gross National Product deflated to 1954 dollars is used. For further information on this new series of real GNP by sector, see Martin L. Marimont, "GNP by Major Industries," Survey of Current Business, October 1962, and the mimeographed supplement, "GNP by Major Industries, Concepts and Methods," op. cit. Employment: Persons Engaged in Production. See appendix C-1 for the source and description of a "person engaged in production."

Appendix A-3

Average Annual Productivity Increase by Industry: 1948, 1957, and 1962

Industry	1948 to 1957 Index[1] (1948=1.000)	Growth %	1957 to 1962 Index (1957=1.000)	Growth %	1948 to 1962 Index (1948=1.000)	Growth %
1. Agriculture, Forestry and Fisheries	1.371	3.6	1.462	7.9	2.005	5.1
2. Mining	1.498	4.6	1.275	5.0	1.909	4.7
3. Contract Construction	1.123	1.3	0.956	-0.3	1.074	0.5
4. Manufacturing	1.242	2.4	1.165	3.1	1.447	2.7
5. Wholesale and Retail Trade	1.159	1.7	1.064	1.3	1.233	1.5
6. Finance, Insurance and Real Estate	1.059	0.6	1.078	1.5	1.142	1.0
7. Transportation	1.276	2.8	1.231	4.3	1.571	3.3
8. Communications and Public Utilities	1.755	6.5	1.413	7.2	2.480	6.7
9. Services	1.113	1.2	1.073	1.4	1.195	1.3
10. Government	0.977	-0.3	1.005	0.0	0.982	-0.1

[1]
$$\text{Index} = \frac{(\text{Output/labor}) \text{ of last year}}{(\text{Output/labor}) \text{ of first year}}$$

Growth = compounded annual percentage increase using terminal years

Source

    Appendix A-2.

Appendix A-4

Average Annual Increase in Employment by Industry: 1948, 1957, and 1962

Industry	1948 to 1957		1957 to 1962		1948 to 1962	
	Index (1948=1.000)	Growth %	Index (1957=1.000)	Growth %	Index (1948=1.000)	Growth %
1. Agriculture, Forestry and Fisheries	0.780	-2.7	0.882	-2.4	0.688	-2.6
2. Mining	0.840	-1.9	0.784	-4.8	0.659	-2.9
3. Contract Construction	1.276	2.8	1.013	0.2	1.293	1.9
4. Manufacturing	1.103	1.1	0.977	-0.5	1.077	0.5
5. Wholesale and Retail Trade	1.148	1.6	1.066	1.1	1.223	1.5
6. Finance, Insurance and Real Estate	1.415	3.9	1.150	2.8	1.627	3.6
7. Transportation	0.949	-0.6	0.898	-2.1	0.852	-1.1
8. Communications and Public Utilities	1.182	1.9	0.962	-0.8	1.137	0.9
9. Services	1.207	2.1	1.135	2.6	1.369	2.3
10. Government	1.459	4.3	1.118	2.3	1.631	3.6

Note: Employment as measured by persons engaged.

Source
    See Appendix A-2.

Appendix A-5

Average Annual Increase in Output by Industrial Sector: 1948 to 1962

Industry	1948	1957	1962	1948 to 1962	
	(GNP — billions of 1954 $)			Index	Average Annual Increase %
1. Agriculture, Forestry, and Fisheries	20.1	21.5	22.9	1.139	0.9
2. Mining	8.9	11.2	11.2	1.258	1.7
3. Contract Construction	13.4	19.2	18.6	1.388	2.4
4. Manufacturing	86.0	117.8	134.1	1.559	3.2
5. Wholesale and Retail Trade	54.5	72.5	82.2	1.508	3.0
6. Finance, Insurance, and Real Estate	32.3	48.4	60.0	1.858	4.5
7. Transportation	17.1	20.7	22.9	2.118	2.1
8. Communications and Public Utilities	9.4	19.5	26.5	2.819	7.7
9. Services	29.4	39.5	48.1	1.636	3.6
10. Government	26.6	37.9	42.6	1.602	3.4

Source:

Appendix A-2.

Appendix A-6

Growth of Output, Employment, and Productivity by Manufacturing Industries: 1948 to 1963

Manufacturing Group SIC Code		FRB Index of Output		
	1948	1963	Index	Growth %
20 Food and Kindred Products	79.6	116.9	1.469	2.6
21 Tobacco Manufactures	83.7	115.2	1.376	2.2
22 Textile Mill Products	90.8	116.9	1.287	1.7
23 Apparel & Related Products	77.3	125.6	1.625	3.3
24 Lumber & Wood Products	91.8	108.9	1.186	1.1
25 Furniture & Fixtures	70.1	129.1	1.842	4.2
26 Paper & Allied Products	64.1	125.1	1.952	4.6
27 Printing, Publishing & Allied Industries	73.3	116.4	1.588	3.1
28 Chemicals & Allied Products	44.9	148.6	3.310	8.3
29 Petroleum Refining & Related Industries	68.1	117.1	1.720	3.7
30 Rubber & Miscellaneous Plastic Products	57.0	140.0	2.456	6.2
31 Leather & Leather Products	88.4	99.8	1.129	0.8
32 Stone, Clay & Glass Products	71.3	117.5	1.648	3.4
33 Primary Metal Industries	94.3	113.3	1.202	1.2
34 Fabricated Metal Products	77.2	123.4	1.598	3.2
35 Machinery	79.0	126.9	1.606	3.2
36 Electrical Equipment & Supplies	53.0	132.3	2.496	6.3
37 Transportation Equipment	46.9	127.0	2.708	6.9
371 Motor Vehicles & Equipment	75.4	146.1	1.938	4.5
372 Aircraft & Parts	16.0	105.8	6.613	13.4
38 Instruments & Related Products	55.2	130.2	2.359	5.9

Source: at end of table.

Appendix A-6 (cont'd)

Total Employees (in 000's)				Productivity		
1948	1963	Index	Growth %	Index[1]	Growth %	SIC Code
1,801	1,744	0.968	-0.2	1.517	2.8	20
114	87.9	0.771	-1.7	1.785	3.9	21
1,332	869	0.667	-2.7	1.929	4.5	22
1,190	1,285	1.080	0.5	1.505	2.8	23
818	587	0.718	-2.2	1.653	3.4	24
346	389	1.124	0.8	1.638	3.3	25
473	620	1.311	1.8	1.489	2.7	26
740	931	1.258	1.5	1.262	1.6	27
655	865	1.321	1.9	2.506	6.3	28
228	190	0.833	-1.2	2.064	4.9	29
312	418	1.340	2.0	1.833	4.1	30
412	351	0.852	-1.1	1.325	1.9	31
549	602	1.097	0.6	1.503	2.8	32
1,290	1,172	0.909	-0.6	1.323	1.9	33
979	1,153	1.178	1.1	1.357	2.1	34
1,372	1,531	1.116	0.7	1.440	2.5	35
991	1,557	1.571	3.1	1.589	3.1	36
1,270	1,609	1.267	1.6	2.137	5.2	37
781	745	0.955	-0.3	2.030	4.8	371
238	635	2.672	6.8	2.475	6.2	372
262	365	1.393	2.2	1.693	3.6	38

[1]Index = Output Index/Employee Index.

Source:
   Output: U.S. Board of Governors of the Federal Reserve System, Industrial Production, 1959 revision (Washington, D.C., 1960). _____, Industrial Production Indexes 1961-1963, September 1964.
   Employment: U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings for the United States 1909-64, bulletin no. 1312-2 (Washington, D.C.: Government Printing Office, December 1964).

Appendix A-7

Average Annual Increase in Prices by Industry: 1948 to 1962

| Industry | GNP Deflators | | | 1948 to 1962 | |
	1948	1957	1962	Index	Average Annual Increase %
1. Agriculture, Forestry, and Fisheries	121.4	94.9	100.9	0.831	-1.3
2. Mining	91.0	103.6	106.3	1.168	1.1
3. Contract Construction	82.8	114.1	138.7	1.675	3.8
4. Manufacturing	85.0	109.6	114.7	1.349	2.2
5. Wholesale and Retail Trade	93.4	108.4	118.6	1.270	1.7
6. Finance, Insurance, and Real Estate	76.5	104.5	113.2	1.480	2.8
7. Transportation	87.1	105.3	102.2	1.173	1.2
8. Communication and Public Utilities	86.2	96.4	98.1	1.138	1.0
9. Services	77.9	112.4	127.9	1.642	3.6
10. Government	75.6	114.2	142.5	1.885	4.8

Source:

Martin L. Marimont, "GNP by Major Industries," Survey of Current Business, October 1962, pp. 6-18.

Appendix B-1

Civilian Employment by Age and Sex, 1948, 1957, and 1962:

Numbers, Distribution, and Change

(persons 14 years of age and older)

Age Group	Number employed in 000's 1948	1957	1962	Percentage Distribution 1948	1957	1962	Numerical Increase in 000's 1962/1948	1957/1948	1962/1957	Percent Increase 1962/1948	1957/1948	1962/1957
Total 14+	59,378	65,011	67,846	100.0	100.0	100.0	8,468	5,633	2,835	14.3	9.5	4.4
14-24	11,825	10,358	11,785	19.9	15.9	17.4	- 40	-1,467	1,427	-0.3	-12.4	13.8
14-19	4,841	4,720	5,339	8.2	7.3	7.9	498	- 121	619	10.3	- 2.5	13.1
Males 14+	42,428	43,990	44,892	71.4	67.6	66.1	2,464	1,562	902	5.8	3.7	2.1
14-24	7,291	6,093	6,975	12.3	9.4	10.3	- 316	-1,198	882	-4.3	-16.4	14.5
14-19	2,911	2,750	3,077	4.9	4.3	4.5	166	- 161	327	5.7	- 5.5	11.9
16-17	1,006	987	990	1.7	1.5	1.5	- 16	- 19	3	-1.6	- 1.9	0.3
18-19	1,362	1,130	1,372	2.3	1.7	2.0	10	- 232	242	0.7	-17.0	21.4
20-24	4,380	3,343	3,898	7.4	5.1	5.7	- 482	-1,037	555	-11.0	-23.7	16.6
25-34	10,068	10,222	9,475	16.9	15.7	13.9	- 593	154	- 747	- 5.9	1.4	- 7.3
35-44	9,393	10,427	10,711	15.8	16.0	15.8	1,318	1,034	284	14.0	11.2	2.6
45-54	7,761	8,851	9,333	13.1	13.6	13.7	1,572	1,090	482	20.3	14.0	5.4
55-64	5,604	6,002	6,260	9.4	9.2	9.2	656	398	258	11.7	7.0	3.3
65+	2,312	2,394	2,137	3.9	3.7	3.1	- 175	82	- 257	- 7.6	3.5	-10.7
Females 14+	16,950	21,021	22,954	28.5	32.3	33.8	6,004	4,071	1,933	35.4	24.0	9.2
14-24	4,534	4,265	4,810	7.6	6.6	7.1	276	- 269	545	6.1	- 5.9	12.8
14-19	1,930	1,970	2,262	3.3	3.0	3.3	332	40	292	17.2	2.1	14.8
16-17	611	626	617	1.0	0.9	0.9	6	15	- 9	1.0	2.5	- 1.4
18-19	1,088	1,037	1,216	1.8	1.6	1.8	128	- 51	179	11.8	- 4.7	17.3
20-24	2,604	2,295	2,548	4.4	3.5	3.8	- 56	- 309	253	- 2.2	-11.9	11.0
25-34	3,787	4,031	3,836	6.4	6.2	5.6	49	244	- 195	1.2	6.3	- 4.7
35-44	3,706	4,921	5,190	6.2	7.5	7.6	1,484	1,215	269	39.9	32.7	5.5
45-54	2,898	4,469	5,158	4.9	6.9	7.5	2,260	1,571	689	78.0	54.3	15.4
55-64	1,522	2,550	3,086	2.6	3.9	4.5	1,564	1,028	536	102.8	67.5	21.0
65+	503	784	875	0.8	1.2	1.3	372	281	91	74.0	55.9	11.6

Source:

Manpower Report of the President, 1963, op. cit.,
Table A-5, p. 142.

Appendix B-2

Civilian Unemployment by Age and Sex, 1948, 1957 and 1962:

Numbers, Distribution, and Change

(persons 14 years old or older)

Age Group	Number Unemployed in 000's			Percentage Distribution			Numerical Increase in 000's		
	1948[1]	1957	1962	1948	1957	1962	1962/1948	1957/1948	1962/1957
Total 14+	2,064	2,936	4,007	100.0	100.0	100.0	1,943	872	1,071
14-24	824	1,003	1,452	39.9	34.2	36.2	628	179	449
14-19	415	573	816	20.1	19.5	20.4	401	158	243
Males 14+	1,430	1,893	2,488	69.3	64.5	62.1	1,058	463	595
14-24	556	634	853	26.9	21.6	21.3	297	78	219
14-19	262	351	472	12.7	11.9	11.8	210	89	121
16-17	103	140	187	5.0	4.8	4.7	84	37	47
18-19	129	159	220	6.3	5.4	5.5	91	30	61
20-24	294	283	381	14.2	9.6	9.5	87	- 11	98
25-34	260	349	446	12.5	11.9	11.1	186	89	97
35-44	203	304	405	9.8	10.4	10.1	202	101	101
45-54	182	302	381	8.8	10.3	9.5	199	120	79
55-64	160	220	300	7.8	7.5	7.4	140	60	80
65+	72	83	103	3.5	2.8	2.6	31	11	20
Females 14+	633	1,043	1,519	30.7	35.5	37.9	886	410	476
14-24	268	369	599	13.0	12.6	14.9	331	101	230
14-19	153	222	344	7.4	7.6	8.6	191	69	122
16-17	60	90	124	2.9	3.1	3.1	64	30	34
18-19	76	107	189	3.7	3.6	4.7	113	31	82
20-24	115	147	255	5.6	5.0	6.4	140	32	108
25-34	144	224	267	6.9	7.6	6.6	123	80	43
35-44	94	195	283	4.5	6.6	7.1	189	101	88
45-54	74	146	223	3.6	5.0	5.6	149	72	77
55-64	43	80	111	2.1	2.7	2.8	68	37	31
65+	10	28	37	0.5	0.9	0.9	27	18	9

[1]Unadjusted definition used. Not strictly comparable to 1957 and 1962. Unadjusted total unemployment rate was 3.4%; adjusted was 3.8%.

Source:
    Manpower Report of the President, 1963, op. cit., Table A-8, p. 144.

Appendix B-3

Labor Force Participation and Unemployment Rates by Age and Sex: 1948, 1957, 1962

| | Participation Rates[1] | | | Unemployment Rates[2] (%) | | | Unemployment Structure[3] | | | Change Between | | | | | |
| | | | | | | | | | | 1948 to 1957 | | 1957 to 1962 | | 1948 to 1962 | |
	1948	1957	1962	1948	1957	1962	1948	1957	1962	P.R.	U.R.	P.R.	U.R.	P.R.	U.R.
Male-Total 14+	84.7	82.7	79.3	3.3	4.1	5.3	1.00	1.00	1.00	-2.0	0.8	-3.4	1.2	-5.4	2.0
14-19	54.5	49.7	43.6	8.3	11.3	13.3	2.52	2.65	2.51	-4.8	3.0	-6.1	2.0	-10.9	5.0
14-15	27.5	25.1	21.6	5.2	7.6	8.3	1.58	1.85	1.56	-2.4	2.4	-3.5	0.7	-5.9	3.1
16-17	53.4	51.1	43.5	9.3	12.4	15.9	2.82	3.02	3.00	-2.3	3.1	-7.6	3.5	-9.9	6.6
18-19	79.9	77.7	71.9	8.7	12.3	13.8	2.64	3.00	2.60	-2.2	3.6	-5.8	1.5	-8.0	5.1
20-24	85.7	89.8	89.1	6.3	7.8	8.9	1.91	1.90	1.68	4.1	1.5	-0.7	1.1	3.4	2.6
25-34	96.1	97.3	97.4	2.5	3.3	4.5	0.76	0.81	0.85	1.2	0.8	0.1	1.2	1.3	2.0
35-44	98.0	97.9	97.7	2.1	2.8	3.6	0.64	0.68	0.68	-0.1	0.7	-0.2	0.8	-0.3	1.5
45-54	95.8	96.4	95.6	2.3	3.3	3.9	0.70	0.81	0.74	0.6	1.0	-0.8	0.6	-0.2	1.6
55-64	89.5	87.5	86.2	2.8	3.5	4.6	0.85	0.85	0.87	-2.0	0.7	-1.3	1.1	-3.3	1.8
65+	46.8	37.5	30.3	3.0	3.4	4.6	0.91	0.83	0.87	-9.3	0.4	-7.2	1.2	-16.5	1.6
Female-Total 14+	31.9	35.9	36.7	3.6	4.7	6.2	1.00	1.00	1.00	4.0	1.1	0.8	1.5	4.8	2.6
14-19	32.5	30.6	29.0	7.3	10.1	13.2	2.03	2.15	2.13	-1.9	2.8	-1.6	3.1	-3.5	5.9
14-15	12.2	12.5	13.2	6.9	7.5	6.7	1.92	1.60	1.08	0.3	0.6	0.7	-0.8	1.0	-0.2
16-17	31.4	31.1	27.1	8.9	12.6	16.8	2.47	2.58	2.71	-0.3	3.7	-4.0	4.2	-4.3	7.9
18-19	52.1	51.5	50.9	6.5	9.4	13.5	1.81	2.00	2.18	-0.6	2.9	-0.6	4.1	-1.2	7.0
20-24	45.3	46.0	47.4	4.2	6.0	9.1	1.17	1.28	1.47	0.7	1.8	1.4	3.1	2.1	4.9
25-34	33.2	35.6	36.4	3.7	5.3	6.5	1.03	1.13	1.05	2.4	1.6	0.8	1.2	3.2	2.8
35-44	36.9	43.3	44.1	2.5	3.8	5.2	0.69	0.81	0.83	6.4	1.3	0.8	1.4	7.2	2.7
45-54	35.0	46.5	50.0	2.5	3.2	4.1	0.69	0.68	0.66	11.5	0.7	3.5	0.9	15.0	1.6
55-64	24.3	34.5	38.7	2.7	3.0	3.5	0.75	0.64	0.56	10.2	0.3	4.2	0.5	14.4	0.8
65+	9.1	10.5	9.9	1.9	3.4	4.1	0.53	0.72	0.66	1.4	1.5	-0.6	0.7	0.8	2.2

[1]Includes Armed Forces. % of noninstitutional population.

[2]Based upon noninstitutional civilian labor force.

[3]Age group rate/Total rate for sex.

Source:

Participation Rates – Manpower Report of the President, 1965 (Washington, D.C.: Government Printing Office, 1965), Table A-2, p. 194

Unemployment Rates – Ibid., Table A-12, p. 205.

Annual averages.

Appendix B-4

Comparison of Nonwhite and White Participation Rates and Changes by Age and Sex: 1948 - 1962

(Civilian population, 14 years and older)

Male	Civilian Participation Rates			Change Between Periods			Nonwhite Change / White Change		
	1948	1957	1962	1962-1948	1957-1948	1962-1957	1948-1962	1948-1957	1957-1962
		%							
White-Total	84.2	82.0	78.6	- 5.6	- 2.2	- 3.4	1.50D	1.82D	1.29D
14-19	50.7	45.8	40.8	- 9.9	- 4.9	- 5.0	2.01D	2.49D	1.54D
20-24	84.4	86.7	86.5	2.1	2.3	- 0.2	1.76I	1.74I	1.50D
25-34	96.0	97.1	97.4	1.4	1.1	0.3	*	0.72I	*
35-44	98.0	97.9	97.9	- 0.1	- 0.1	0.0	27.00D	7.00D	***
45-54	95.9	96.6	96.0	0.1	0.7	- 0.6	25.00D	*	2.16D
55-64	89.6	87.4	86.7	- 2.9	- 2.2	- 0.7	2.45D	2.91D	1.00D
65+	46.5	37.6	30.6	-15.9	- 8.9	- 7.0	1.45D	1.62D	1.24D
Nonwhite-Total	84.8	80.8	76.4	- 8.4	- 4.0	- 4.4	D = decreased; both white		
14-19	58.3	46.1	38.4	-19.9	-12.2	- 7.7	and nonwhite		
20-24	85.6	89.6	89.3	3.7	4.0	- 0.3	I = increased; both white		
25-34	95.3	96.1	95.3	0.0	0.8	- 0.8	and nonwhite		
35-44	97.2	96.5	94.5	- 2.7	- 0.7	- 2.0	* = nonwhite decreased or		
45-54	94.7	93.5	92.2	- 2.5	- 1.2	- 1.3	remained the same;		
55-64	88.6	82.2	81.5	- 7.1	- 6.4	- 0.7	whites increased		
65+	50.3	35.9	27.2	-23.1	-14.4	- 8.7	***= nonwhite decreased; white		
							remained the same		

Source:

At end of Table.

Female	Civilian Participation Rates			Change Between Periods			Nonwhite Change / White Change		
	1948	1957	1962	1962-1948	1957-1948	1962-1957	1948-1962	1948-1957	1957-1962
		%							
White-Total	30.6	34.7	35.6	5.0	4.1	0.9	0.24I	0.27I	0.11I
14-19	32.8	31.3	29.7	3.1	-1.5	-1.6	*	3.13D	1.13D
20-24	45.1	45.9	47.1	2.0	0.8	1.2	0.75I	*	1.58I
25-34	31.3	33.5	34.1	2.8	2.2	0.6	0.50I	*	2.50I
35-44	35.1	41.4	42.2	7.1	6.3	0.8	0.90I	0.87I	1.12I
45-54	33.3	45.4	48.9	15.6	12.1	3.5	0.60I	0.48I	1.03I
55-64	23.3	33.7	38.0	14.7	10.4	4.3	0.58I	0.64I	0.42I
65+	8.6	10.3	9.8	1.2	1.7	-0.5	*	*	2.20D
Nonwhite-Total	44.4	45.5	45.6	1.2	1.1	0.1	D = decreased; both white		
14-19	30.5	25.8	24.0	-6.5	-4.7	-1.8	and nonwhite		
20-24	47.1	46.7	48.6	1.5	-0.4	1.9	I = increased; both white		
25-34	50.6	50.5	52.0	1.4	-0.1	1.5	and nonwhite		
35-44	53.3	58.8	59.7	6.4	5.5	0.9	* = nonwhite decreased or		
45-54	51.1	56.9	60.5	9.4	5.8	3.6	remained the same		
55-64	37.6	44.3	46.1	8.5	6.7	1.8			
65+	17.5	13.3	12.2	-5.3	-4.2	-1.1			

Source:

The Manpower Report of the President, 1964, op. cit., Table A-3, p. 197.

Appendix C-1

Industrial Employment, Including Military, by Various Series: 1947 and 1962

(in 000's)

	1947				1962				% change 1947-1962			
	#1	#2	#3	#4	#1	#2	#3	#4	#1	#2	#3	#4
TOTAL	47,453	49,713	57,652	52,523	59,287	63,256	68,679	62,020	24.9	27.2	19.1	18.3
Agriculture, Forestry and Fisheries	2,392	2,427	7,042	7,042	2,017	2,031	4,873	4,873	-16.1	-16.3	-30.8	-31.5
Mining	938	938	973	955	624	624	673	650	-33.5	-33.5	-30.8	-29.1
Construction	2,062	2,062	3,007	1,982	2,870	2,870	4,212	2,902	39.2	39.2	40.1	46.4
Manufacturing	15,215	15,215	15,406	15,545	16,478	16,478	16,661	16,853	8.3	8.3	8.2	8.4
Wholesale and Retail Trade	8,688	9,546	11,001	8,956	11,339	12,542	13,727	11,566	30.5	31.4	24.8	29.1
Finance, Insurance and Real Estate	1,643	1,746	1,866	1,754	2,747	2,886	3,143	2,800	67.2	65.3	68.4	59.6
Transportation	2,869	2,996	3,045		2,369	2,491	2,557	2,471	-17.4	-16.9	-16.0	
Communication and				4,166								-6.2
Public Utilities	1,177	1,181	1,190		1,434	1,439	1,456	1,435	21.8	21.8	22.4	
Services	5,732	6,307	7,385	5,050	8,298	9,823	10,266	7,947	44.8	55.7	39.0	57.4
Government (including military)	6,732	7,290	6,732	7,073	11,107	12,068	11,107	11,690	65.0	65.5	65.0	65.3
Rest of World	5	5	5	---	4	4	4	---	-20.0	-20.0	-20.0	---

Series #1:   Number of full-time equivalent employees.
    #2:   Average number of full-time and part-time employees.
    #3:   Number of persons engaged in production.
    #4:   Non-agricultural employees on payroll with agricultural and military employees taken from Series #3.

More detailed definitions on next page.

Source: At end of definitions.

Appendix C-1 (Cont'd)

Definition of Series

Series #1 - "Full-time equivalent employment measures man - years of full time employment of wage and salary workers and its equivalent in work performed by part time workers. Full-time employment is defined simply in terms of the number of hours which is customary at a particular time and place."[1] It may mean 30 hours in one industry and 60 in another, or, in the same plant, 30 hours in 1932 and 55 in 1943.

This series does not count proprietors, own account workers, or unpaid family workers.[2]

Series #2 - "Average Number of Full-Time and Part-Time Employees" - refers to wage and salary workers as in Series #1, but does not attempt to reduce to full-time equivalent employment.

Where industries have little part-time employment, average numbers of full and part-time workers (this series) are used. This is done in manufacturing, mining, construction, farming and most of communication, public utilities and a number of industry subgroups within industry divisions.[3]

Series #3 - "Persons Engaged in Production" - "This series measures manyears of full-time employment by persons working for wages or salaries [as shown in Series #1] and by active proprietors of unincorporated enterprises devoting the major por-

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[1] U.S. Department of Commerce, Office of Business Economics, U.S. Income and Output (Washington, D.C.: Government Printing Office, 1958), p. 211.

[2] Edward F. Denison, "Revised Estimates of Wages and Salaries in the National Income, 1929-1943," Survey of Current Business, June 1945, p. 18.

[3] Ibid., p. 17.

Appendix C-1 (Cont'd)

tion of their time to the business. Persons
engaged falls short of total man-years of full-
time employment because of the exclusion from
the data of unpaid family workers."[1]

Series #4 - Employees in non-agricultural establishments -
payroll reports are used to prepare this series
by the Bureau of Labor Statistics. "The data
exclude proprietors, the self-employed, unpaid
family workers, farm workers and domestic wor-
kers in households. Salaried officers of cor-
porations are included."[2] Agricultural workers
and members of the armed forced excluded but are
included in series #4 by adding the statistics
found in Series #3 for these two groups.

Source:

Series #1:   1947 - U.S. Income and Output, op. cit.,
                     Table VI-13, p. 211.
              1962 - Survey of Current Business, July 1964,
                     Table 52, p. 29.

Series #2:   1947 - U.S. Income and Output, op. cit.,
                     Table VI-14, p. 212.
              1962 - Survey of Current Business, July 1964,
                     Table 53, p. 30.

Series #3:   1947 - U.S. Income and Output, op. cit.,
                     Table VI-16, p. 214.
              1962 - Survey of Current Business, July 1964,
                     Table 55, p. 30.

Series #4:   1947 & Employment and Earnings . . . 1909-64,
              1962   op. cit., Table 1, p. xiv, plus inner
                     tables for more specific data.
                     Agriculture and military from Series #3.

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[1] U.S. Income and Output, op. cit., p. 214

[2] Employment and Earnings Statistics for the United States,
1909-1964, op. cit., p. 655.

Appendix C-2

Industrial Employment 1899-1962, Selected Years

(persons engaged in production)

Industrial Sector	Employment (in thousands)					Percent of Total Employment				
	1899	1909	1929	1948	1962	1899	1909	1929	1948	1962
Total	26,861	34,785	47,611	60,216	70,036	100.00	100.00	100.00	100.00	100.00
1. Agriculture, Forestry, Fisheries	9,912	10,562	10,075	8,253	5,566	36.90	30.36	21.16	13.71	7.95
2. Mining	659	1,079	1,057	1,005	650	2.45	3.10	2.22	1.67	0.93
3. Contract Construction	1,315	1,744	2,392	3,326	4,341	4.90	5.01	5.02	5.52	6.20
4. Manufacturing	5,365	7,679	10,560	15,481	16,681	19.97	22.08	22.20	25.71	23.82
Production Workers	(NA)	6,272	8,567	12,910	12,488	(NA)	18.05	18.00	20.75	17.84
5. Wholesale and Retail Trade	2,892	4,089	8,028	11,474	14,066	10.77	11.76	16.86	19.05	20.08
6. Finance, Insurance and Real Estate	325	559	1,592	1,942	3,162	1.21	1.61	3.34	3.23	4.51
7. Transportation	1,908	2,691	3,051	3,013	2,575	7.10	7.74	6.41	5.00	3.68
8. Public Utilities and Communication	167	368	1,034	1,282	1,458	0.62	1.06	2.17	2.13	2.08
9. Services	3,204	4,360	6,628	7,647	10,449	11.93	12.53	13.92	12.70	14.92
10. Government, (including military)	1,114	1,654	3,184	6,793	11,088	4.15	4.75	6.69	11.28	15.83

NA = not available

Source: 1899-1948, John W. Kendrick, Productivity Trends in the United States (National Bureau of Economic Research (Princeton, N.J.: Princeton University Press, 1961), p. 308 ; 1962 - See Appendix C-3 ; Production workers - Employment and Earnings . . . , 1909-1964, op. cit., p. 33.

Appendix C-3

Persons Engaged in Production by Industry: Comparison between Kendrick and the Department of

Commerce, 1929-62, and the Method for Updating Kendrick to 1962

(in 000's)

Industry	1929		1937		1948		1953	
	Kendrick	Commerce	Kendrick	Commerce	Kendrick	Commerce	Kendrick	Commerce
Total	47,611	46,216	48,233	47,157	60,216	58,581	66,219	65,070
1. Agriculture, Forestry, and Fisheries	10,075	9,205	9,484	8,864	8,253	7,012	7,125	5,885
2. Mining	1,057	1,017	963	993	1,005	1,021	873	896
3. Contract Construction	2,392	2,306	1,807	1,738	3,326	3,262	3,716	3,801
4. Manufacturing	10,570	10,556	10,696	10,686	15,481	15,468	17,428	17,262
5. Wholesale and Retail Trade	8,028	7,821	8,384	8,162	11,474	11,309	12,266	12,282
6. Finance, Insurance and Real Estate	1,592	1,575	1,538	1,520	1,942	1,923	2,235	2,320
7. Transportation	3,051	3,034	2,351	2,333	3,013	3,000	2,974	2,997
8. Communications and Public Utilities	1,034	1,034	901	901	1,282	1,281	1,401	1,403
9. Services	6,628	6,484	6,579	6,429	7,647	7,532	8,220	8,026
10. Government	3,184	3,184	5,530	5,530	6,793	6,800	9,981	9,993

Source: At end of table.

Industry	1957 Kendrick	1957 Commerce	1957 Kendrick-Commerce	1962 Commerce	Estimation of Kendrick = Commerce (1962) + 1957 difference
Total	67,728	66,405	1,328	68,713	70,036
1. Agriculture, Forestry, & Fisheries	6,161	5,418	743	4,823	5,566
2. Mining	839	862	- 23	673	650
3. Contract Construction	4,259	4,135	124	4,217	4,341
4. Manufacturing	17,065	17,047	18	16,663	16,681
5. Wholesale & Retail Trade	13,187	12,953	234	13,832	14,066
6. Finance, Insurance and Real Estate	2,749	2,716	33	3,129	3,162
7. Transportation	2,867	2,849	18	2,557	2,575
8. Communications & Public Utilities	1,516	1,514	2	1,456	1,458
9. Services	9,160	8,982	178	10,271	10,449
10. Government	9,925	9,925	0	11,088	11,088

Source:

1929-57: Kendrick: John W. Kendrick, op. cit., pp. 304-308.

Commerce:

1929-39: U.S. Department of Commerce, Office of Business Economics, National Income: 1954 edition (Washington, D.C.: Government Printing Office, 1954), Table 28, pp. 202-203.

1948-57: U.S. Income and Output, op. cit., Table VI-16, p. 214.

1962: Survey of Current Business, July 1963, Table 55, p. 34.

Appendix C-4

Changes in Employment and Unemployment by Industry: 1948, 1957, and 1962

Industry	1948 Employed (in 000's)	Unemployed Rate %	Rate Total Rate	1957 Employed (in 000's)	Unemployed Rate %	Rate Total Rate	1962 Employed (in 000's)	Unemployed Rate%	Rate Total Rate
Total	58,581	3.7	1.00	66,578	4.5	1.00	68,713	5.5	1.00
1. Agriculture, Forestry and Fisheries	7,012	4.7	1.27	5,470	6.7	1.49	4,823	7.3	1.33
2. Mining	1,021	2.9	0.78	858	6.3	1.40	673	8.6	1.56
3. Contract Construction	3,262	7.6	2.05	4,161	9.8	2.18	4,217	12.0	2.18
4. Manufacturing	15,163	3.5	0.95	17,054	5.0	1.11	16,663	5.8	1.06
5. Wholesale and Retail Trade	11,309	4.3	1.16	12,980	4.5	1.00	13,832	6.3	1.15
6. Finance, Insurance and Real Estate	1,923	1.6	0.43	2,721	1.8	0.40	3,129	3.1	0.56
7. Transportation 8. Communications and Public Utilities	4,281	3.0	0.81	4,360	3.1	0.69	4,013	3.9	0.71
9. Services	7,500	3.5	0.95	9,052	3.4	0.76	10,271	4.3	0.78
10. Government	6,800	2.0	0.54	9,918	2.0	0.44	11,088	2.2	0.40

Note: 1948 unemployment not adjusted to 1957 definition change.

Source: At end of table.

Appendix C-4 (cont'd)

		1948-57 % Change		1957-62 % Change		1948-62 % Change	
		Employed	Unemploy. Rate	Employed	Unemploy. Rate	Employed	Unemploy. Rate
1.	Agriculture, Forestry and Fisheries	-22.0	+42.6	-11.8	+ 9.0	-31.2	+55.3
2.	Mining	-16.0	+117.2	-21.6	+36.5	-34.1	+196.6
3.	Contract Construction	+27.6	+28.9	+ 1.3	+22.4	+29.3	+57.9
4.	Manufacturing	+12.5	+42.9	- 2.3	+16.0	+ 9.9	+65.7
5.	Wholesale and Retail Trade	+14.8	+ 4.7	+ 6.6	+40.0	+22.3	+46.5
6.	Finance, Insurance, and Real Estate	+41.5	+12.5	+15.0	+72.2	+62.7	+93.8
7. 8.	Transportation Communications and Public Utilities	+ 1.8	+ 3.3	- 8.0	+25.8	- 6.3	+30.0
9.	Services	+20.7	- 2.9	+13.5	+26.5	+36.9	+22.9
10.	Government	+45.9	+ 0.0	+11.8	+10.0	+63.1	+10.0

Source: Employed - Appendix A-2.

Unemployment Rate - Presidents Manpower Report, 1963, op. cit., Table A-11, p. 146.

Appendix C-5
Employment and Distribution by Occupation: Selected Years, 1900-1962

Occupation	Employment (in millions) Census Data				BLS Data		Distribution of Employment Total=100.0% Census Data				BLS Data	
	1900	1920	1930	1950	1950	1962	1900	1920	1930	1950	1950	1962
Total	29.0	42.2	48.7	59.0	59.6	67.8	100.0	100.0	100.0	100.0	100.0	100.0
White Collar (exc. farm) total	5.1	10.5	14.3	21.6	22.4	29.9	17.6	24.9	29.4	36.6	37.6	44.1
Professional and Technical	1.2	2.3	3.3	5.1	4.5	8.0	4.3	5.4	6.8	8.6	7.6	11.8
Mgrs., Officials and Proprietors	1.7	2.8	3.6	5.2	6.4	7.4	5.8	6.6	7.4	8.7	10.7	10.9
Clerical	0.9	3.4	4.3	7.2	7.6	10.1	3.0	8.0	8.9	12.3	12.8	14.9
Sales	1.3	2.1	3.1	4.1	3.8	4.3	4.5	4.9	6.3	7.0	6.4	6.3
Blue Collar & Farm Total	21.3	28.4	29.6	31.3	30.7	29.1	73.3	67.2	60.8	52.9	51.5	43.0
Blue Collar Total	10.4	17.0	19.3	24.3	23.3	24.3	35.8	40.2	39.6	41.1	39.1	35.8
Craftsmen, Foremen	3.1	5.5	6.2	8.4	7.7	8.7	10.5	13.0	12.8	14.1	12.9	12.8
Operatives	3.7	6.6	7.7	12.0	12.1	12.0	12.8	15.6	15.8	20.4	20.3	17.7
Laborers (exc. farm and mine)	3.6	4.9	5.3	3.9	3.5	3.6	12.5	11.6	11.0	6.6	5.9	5.3
Farm Total	10.9	11.4	10.3	7.0	7.4	4.8	37.5	27.0	21.2	11.8	12.4	7.2
Farmers & Farm Managers	5.8	6.4	6.0	4.4	4.4	2.6	19.9	15.3	12.4	7.4	7.4	3.8
Farm Laborers and Foremen	5.1	4.9	4.3	2.6	3.0	2.3	17.7	11.7	8.8	4.4	5.0	3.3
Service Total	2.6	3.3	4.8	6.2	6.5	8.8	9.0	7.8	9.8	10.5	11.0	13.0
Private Household	1.6	1.4	2.0	1.5	1.9	2.3	5.4	3.3	4.1	2.6	3.2	3.4
Service (exc. private)	1.0	1.9	2.8	4.6	4.7	6.5	3.6	4.5	5.7	7.9	7.9	9.6

Note: 1900-1930 - Census includes all employed from 10 years old. Census from decentenial
       1940-1950 - Census indludes all employed from 14 years old. census of population
                                                                     BLS from Monthly Labor
                                                                     Force Survey

Source: Economic Almanac 1964, op. cit., pp. 44-45.

Appendix C-6

Occupations of Major Industrial Employment: 1950 and 1960

(in 000's)

Occupations	Total Goods Producing Industries		Agriculture Forestry & Fisheries		Mining		Contract Construction		Manufacturing		Transportation	
	1950	1960	1950	1960	1950	1960	1950	1960	1950	1960	1950	1960
A Total Employment	28,723	29,085	7,017	4,344	928	654	3,398	3,818	14,453	17,530	2,927	2,739
B Professional, Technical & Kindred	964	1,672	44	56	33	48	126	178	701	1,323	59	67
C Managers, Officials, and Proprietors (exc. farm)	1,264	1,559	20	24	37	38	284	375	691	892	232	229
D Clerical & Kindred	2,219	2,816	19	32	42	48	109	169	1,584	2,097	464	470
E Sales Workers	457	704	5	9	2	3	10	15	428	659	10	20
F Craftsmen, Foremen, and Kindred	5,548	6,113	20	29	159	146	1,934	2,052	2,822	3,434	522	451
G Operatives and Kindred	8,651	9,381	56	104	645	356	258	335	6,617	7,487	1,075	1,098
H Laborers (except farm and mining)	2,487	2,092	138	128	1	0	649	646	1,269	1,039	243	280
I Private Household	0	0	0	0	0	0	0	0	0	0	0	0
J Service (except private household)	426	419	10	12	7	6	15	20	273	287	12	94
K Farmers and Farm Managers	4,284	2,508	4,284	2,508	0	0	0	0	0	0	0	0
L Farm Laborers and Foremen	2,417	1,440	2,417	1,440	0	0	0	0	0	0	0	0
ONR Occ. not reported	97	381	3	3	2	7	12	28	68	312	12	30

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Occupations	Total Non-goods Producting Industries 1950	1960	Wholesale and Retail Trade 1950	1960	Finance, Insurance and Real Estate 1950	1960	Communications and Public Utilities 1950	1960	Services 1950	1960	Government 1950	1960	Industry not Reported 1950	1960
A	26,301	32,949	10,389	11,798	1,883	2,695	1,420	1,719	10,119	13,542	2,491	3,194	780	2,612
B	3,880	5,533	210	230	61	90	91	161	3,225	4,616	292	437	14	17
C	3,626	3,827	2,393	2,249	317	469	67	111	596	683	252	316	21	22
D	4,591	6,461	1,196	1,621	789	1,250	553	594	967	1,643	1,086	1,350	56	29
E	3,418	3,925	2,866	3,192	445	603	11	22	90	105	5	4	19	14
F	2,216	2,620	635	870	44	51	401	501	931	927	206	271	26	20
G	2,400	2,513	1,314	1,423	13	12	137	149	819	818	117	110	32	27
H	836	960	333	437	33	37	127	125	225	251	117	110	50	41
I	1,432	1,716	0	0	0	0	0	0	1,432	1,716	0	0	0	0
J	3,827	5,021	1,420	1,631	172	154	25	29	1,811	2,663	398	544	19	16
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ONR	76	375	20	146	7	30	8	26	22	121	18	52	543	2,426

Source: U.S. Department of Commerce, Bureau of the Census

For 1950: U.S. Census of Population: 1950

For 1960: U.S. Census of Population: 1960

Subject Reports: Occupation by Industry, Table 1.

Appendix C-7

Percent Distribution of Occupations of Major Industrial Employment: 1950 and 1960

Industry / Occupation	Total Goods 1950	1960	Agriculture Forestry, & Fisheries 1950	1960	Mining 1950	1960	Contract Construction 1950	1960	Manufacturing Total 1950	1960	Transportation 1950	1960
Total Employed (14 years +)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
White Collar	17.08	23.21	1.26	2.76	12.29	21.14	15.59	19.29	23.64	28.36	26.18	28.69
Professional, technical and kindred workers	3.36	5.75	0.632	1.28	3.54	7.41	3.72	4.67	4.85	7.55	2.03	2.44
Managers, officials, and proprietors excluding farm	4.40	5.36	0.281	0.552	3.97	5.88	8.35	9.82	4.78	5.09	7.93	8.37
Clerical and kindred workers	7.73	9.68	0.269	0.727	4.53	7.41	3.21	4.42	10.96	11.96	15.86	17.17
Sales workers	1.59	2.42	0.075	0.202	0.249	0.435	0.305	0.380	2.96	3.76	0.356	0.713
Blue Collar	82.59	75.47	98.70	97.16	87.51	77.81	84.06	79.97	75.97	69.86	73.41	70.19
Craftsmen, foremen and kindred workers	19.00	21.02	0.291	0.672	17.17	22.35	56.93	53.76	19.52	19.59	17.84	16.47
Operatives and kindred workers	30.12	32.25	0.801	2.39	69.53	54.47	7.58	8.79	45.78	42.71	36.74	40.08
Laborers, except farm and mining	8.66	7.19	1.97	2.95	0.074	0	19.10	16.91	8.78	5.92	14.71	10.22

244.

Industry / Occupation	Total Goods 1950	1960	Agriculture Forestry & Fisheries 1950	1960	Mining 1950	1960	Contract Construction 1950	1960	Manufacturing Total 1950	1960	Transportation 1950	1960
Private Household workers	0	0	0	0	0	0	0	0	0	0	0	0
Service workers except private household	1.48	1.44	0.137	0.278	0.734	0.986	0.450	0.513	1.89	1.64	4.12	3.42
Farmers and farm managers	14.92	8.62	61.06	57.73	0	0	0	0	0	0	0	0
Farm laborers and foremen	8.41	4.95	34.44	33.14	0	0	0	0	0	0	0	0
Occupations not reported	0.34	1.31	0.050	0.074	0.217	1.06	0.357	0.732	0.468	1.78	0.412	1.11

Source: At end of table.

Appendix C-7 (cont'd)

Industry Occupation	Total Non-Goods 1950	1960	Wholesale and Retail Trade 1950	1960	Finance Insurance and Real Estate 1950	1960	Communi- cations and Public Utilities 1950	1960	Services 1950	1960	Public Adminis- tration 1950	1960
Total Employed (14 years +)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
White Collar	58.97	59.92	64.16	61.80	85.65	89.45	50.85	51.67	48.21	52.04	65.64	65.96
Professional, techincal and kindred workers	14.75	16.79	2.02	1.95	3.26	3.33	6.40	9.37	31.87	34.09	11.73	13.67
Managers, officials, and proprietors excluding farm	13.78	11.61	23.04	19.06	16.85	17.39	4.75	6.44	5.89	5.04	10.10	9.90
Clerical and kindred workers	17.45	19.61	11.51	13.74	41.89	46.37	38.95	34.56	9.56	12.13	43.61	42.27
Sales Workers	12.99	11.91	27.59	27.05	23.65	22.36	0.752	1.30	0.894	0.775	0.201	0.119
Blue Collar	40.72	38.96	35.64	36.96	13.96	9.44	48.58	46.80	51.57	47.07	33.62	32.43
Craftsmen, foremen and kindred workers	8.43	7.95	6.11	7.37	2.32	1.89	28.23	29.14	9.20	6.85	8.27	8.50
Operatives and kindred workers	9.12	7.63	12.65	12.06	0.711	0.457	9.62	8.67	8.09	6.04	4.69	3.45
Laborers except farm and mining	3.18	2.91	3.21	3.70	1.77	1.37	8.94	7.27	2.23	1.85	4.68	3.46
Private Household workers	5.44	5.21	0	0	0	0	0	0	14.15	12.67	0	0
Service workers except private household	14.55	15.24	13.67	13.83	9.16	5.72	1.79	1.72	17.90	19.66	15.98	17.02
Farmers and farm managers	0	0	0	0	0	0	0	0	0	0	0	0

Industry / Occupation	Total Non-Goods		Wholesale and Retail Trade		Finance Insurance and Real Estate		Communications and Public Utilities		Services		Public Administration	
	1950	1960	1950	1960	1950	1960	1950	1960	1950	1960	1950	1960
Farm laborers and foremen	0	0	0	0	0	0	0	0	0	0	0	0
Occupations not reported	0.29	1.14	0.195	1.24	0.386	1.11	0.581	1.53	0.220	0.895	0.724	1.61

Source: Appendix C-6.

Appendix C-8

White Collar and Blue Collar Employment in Goods and Non-Goods Producing Industries: 1950 and 1960

Sectors	1950			1960		
	White Collar	Blue Collar	Blue Collar Without Service	White Collar	Blue Collar	Blue Collar Without Service
Goods Producing						
Agriculture	88,317	6,928,233	6,918,633	119,881	4,224,428	4,212,336
Mining	114,000	814,260	807,450	138,184	515,795	509,344
Construction	529,560	2,868,480	2,853,180	736,758	3,080,920	3,061,326
Manufacturing	3,404,760	11,048,310	10,775,130	4,970,732	12,559,030	12,272,199
Transportation	766,410	2,160,600	2,039,880	786,289	1,953,110	1,859,448
Total Type	4,903,047	23,819,883	23,394,273	6,751,844	22,333,283	21,914,653
Total Sector	←—28,722,930—→		28,297,320—↑	↑—29,085,127—→		28,666,497—↑
Non-Goods Producing						
Communication	721,740	697,770	672,360	888,344	830,806	801,315
Trade	6,665,760	3,722,910	2,302,860	7,291,340	4,506,559	2,875,083
Finance	1,612,650	270,060	97,680	2,411,132	284,366	130,209
Service	4,878,480	5,240,520	3,429,450	7,046,422	6,495,956	3,833,265
Government	1,634,950	855,720	457,590	2,106,818	1,087,432	543,849
Total Type	15,513,580	10,786,980	6,960,040	19,744,056	13,205,119	8,183,721
Total Sector	←—26,300,560—→		22,473,620—↑	↑—32,949,175—→		27,927,777—↑
Total Both Sectors	55,023,490	50,770,940		62,034,302	56,594,274	

White Collar

Professional, techincal and kindred workers

Managers, officials, and proprietors except farm

Clerical and kindred workers

Sales workers

Blue Collar

Farmers and farm managers

Craftsmen, foremen and kindred workers

Operatives and kindred workers

Private household workers

Farm laborers and foremen

Laborers, except farm and mining

(Service workers, except private household)

Source: U.S. Census of Population, 1950 and 1960
        Occupation by Industry, op. cit.

Appendix C-9

Percent Distribution of White and Blue Collar Employment in
Goods and Non-Goods Producing Industries: 1950 and 1960
Blue collar includes service occupations

1950

Occupation Industry	White Collar	Blue Collar	Total
Goods	8.91	43.29	52.20
Non-Goods	28.19	19.60	47.79
Total	37.10	62.89	100.00

1960

Occupation Industry	White Collar	Blue Collar	Total
Goods	10.88	36.00	46.88
Non-Goods	31,83	21.29	53.12
Total	42.71	57.29	100.00

Source: Appendix C-8.

Appendix C-10

Components of Employment Change by Industry and Occupation: 1950 and 1960

(Blue collar includes service occupation)

Employment	(1) 1950 (in 000's)	(2) 1960 (in 000's)	(3) % Change	(4) National Growth	(5) Sector Growth (in 000's)	(6) Growth due to Shift	(7) Total Change (in 000's)
United States, total	55,023	62,034	12.7				
Goods producing sector	28,726	29,085	1.2				
White Collar	4,903	6,752	37.7	623	-564	1,790	1,849
Blue Collar	23,820	22,333	-6.2	3,025	-2,739	-1,763	-1,477
Goods - Total				3,648	-3,303	27	372
Non-Goods Producing Sector	26,301	32,949	25.3				
White Collar	15,514	19,744	27.3	1,970	1,955	310	4,235
Blue Collar	10,787	13,205	22.4	1,370	1,359	-334	2,395
Non-Goods - Total				3,340	3,314	-24	6,630

Columns: (1) and (2)   Census data
(3)   Percentage change between 1950 and 1960
(4)   Column (1) times the national growth rate
(5)   Column (1) times (the sector rate - the national rate)
(6)   Column (1) times (the occupation rate - the sector rate)
(7)   Columns (4) + (5) + (6)

This method of calculation was utilized by Lowell D. Ashby in "The Geographical Redistribution of Employment: An Examination of the Elements of Change," Survey of Current Business, October, 1964, pp. 13-20.

Source: Appendix C-8.

Appendix C-11

Calculation of Full-Time Employment Equivalents for 1948 and 1962 by Occupation

Occupations		1-14	15-34	Total Workers in Hours Worked Classes 35-39	40	41-48	49-59	60+
B.	Professional, Technical and Kindred	131,670	517,670	298,590	1,995,330	821,910	340,440	422,730
C.	Managers, Officials, and Proprietors (excluding farm)	37,980	162,810	101,070	1,178,400	1,112,880	677,610	1,344,120
D.	Clerical and Kindred	111,570	413,190	526,740	4,196,520	1,057,110	202,650	123,900
E.	Sales workers	216,300	356,940	105,930	1,126,740	1,002,450	448,920	431,970
F.	Craftsmen and Kindred	95,400	505,470	233,760	4,084,830	1,534,260	576,810	332,430
G.	Operatives and Kindred	169,920	1,075,350	465,540	5,764,140	1,826,100	698,010	540,420
H.	Laborers (except farm and mine)	110,670	401,190	82,050	1,752,750	557,400	167,640	109,740
I.	Private Household	196,440	384,720	62,190	256,230	206,820	107,100	121,110
J.	Service (except private household)	167,160	480,690	126,990	1,236,690	1,170,330	409,140	466,770
K.	Farmers and Farm Managers	93,360	424,650	93,420	419,010	322,380	662,310	1,986,180
L.	Farm Laborers and Foremen	68,100	628,560	76,140	305,160	225,690	322,170	680,640

Source: At end of table.

Occupations	1950 Total Hours[1]	Employ-ment	1950 Average Hours[2]	1950 Factor[3]	1948 Employ-ment	1948 "Full-time" Employ-ment[4]
					(in 000's)	
B. Professional, Technical and Kindred	184,861,620	4,528,650	40.8	0.976	3,977	3,882
C. Managers, Officials, and Proprietors (except farm)	221,910,585	4,614,870	48.1	1.151	6,344	7,302
D. Clerical and Kindred	263,728,605	6,631,680	39.8	0.952	7,438	7,081
E. Sales Workers	154,125,195	3,689,250	41.8	1.000	3,641	3,641
F. Craftsmen and Kindred	304,023,945	7,353,960	41.3	0.988	8,119	8,022
G. Operatives and Kindred	426,790,245	10,539,480	40.5	0.969	12,396	12,012
H. Laborers (except farm and mine)	124,246,290	3,181,440	39.1	0.935	3,473	3,247
I. Private Household	45,702,660	1,334,610	34.2	0.818	1,754	1,435
J. Service (except private household	169,376,280	4,057,770	41.7	0.998	4,286	4,277
K. Farmers and Farm Managers	200,602,515	4,001,310	50.1	1.199	4,668	5,597
L. Farm Laborers and Foremen	99,202,835	2,306,460	43.0	1.029	3,213	3,306
Total	2,194,570,775	52,239,480	42.0			

[1] Employment in each class times mean hours of class interval, with 60 for 60+ class.

[2] Total Hours/Total Employment by occupation.

[3] Average Hours/41.8. 41.8 hrs. is actual total average workweek for 1950.

[4] 1948 actual employment x 1950 factor. Assumes factor applies for 1948. No hourly data in 1948.

Source: At end of table.

Occupation	1962 Average Hours	1962 Factor	Actual 1962 Employment (000's)	Adjusted[1] 1962 Employment (000's)	Adjusted 1948 Employment (000's)	Percentage Change 1962 / 1948
B. Professional, Technical and Kindred	41.7	1.0296	8,040	8,278	3,882	113.2
C. Managers, Officials and Proprietors (except farm)	49.3	1.2173	7,408	9,018	7,302	23.5
D. Clerical and Kindred	37.7	0.9309	10,107	9,409	7,081	32.9
E. Sales Workers	37.3	0.9210	4,346	4,003	3,641	9.9
F. Craftsmen and Kindred	41.6	1.0272	8,678	8,914	8,022	11.1
G. Operatives and Kindred	40.6	1.0025	12,041	12,071	12,012	0.5
H. Laborers (except farm and mine)	34.9	0.8617	3,559	3,067	3,247	- 5.5
I. Private Household Workers	24.7	0.6099	2,341	1,428	1,435	- 0.5
J. Service Workers (except private household)	38.7	0.9556	6,461	6,237	4,277	45.8
K. Farmers and Farm Managers	51.7	1.2765	2,271	2,899	5,597	-48.2
L. Farm Laborers and Foremen	39.1	0.9654	2,595	2,505	3,306	-24.2
Total	40.5	1.0000				

[1]Adjusted 1962 employment = Actual 1962 Employment x 1962 Factor.

Source: 1950 Hours and Employment: U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population 1950, Occupational Characteristics, Special Report P-E No. 18, Table 14, pp. 1B-135 to 1B-146. 1948 Employment: Manpower Report of the President, 1963, op. cit., p. 158, Table B-14. 1962 Hourly Data: Employment and Earnings, September 1963. 1962 Employment: Manpower Report of the President, 1963, op. cit., Table B-14, p. 158.

Appendix D-1

Civilian Population and Labor Force Data by Sex: 1952, 1957, 1959 and 1962

(18 years and older in 000's)

	Population	Participation Rate %	Labor Force	Employed	Unemployed	Unemployment Rate %
Both Sexes						
March 1962	116,830	58.2	67,988	63,939	4,049	6.0
March 1959	112,008	57.9	64,815	60,801	4,014	6.2
March 1957	109,456	58.0	63,492	60,897	2,595	4.1
October 1952	101,340	60.0	60,772	59,638	1,134	1.9
Male						
March 1962	55,821	80.6	45,011	42,332	2,679	6.0
March 1959	53,789	81.0	43,564	40,839	2,725	6.3
March 1957	52,489	82.1	43,083	41,328	1,755	4.1
October 1952	47,744	87.3	41,684	41,066	618	1.5
Female						
March 1962	61,009	37.7	22,977	21,607	1,370	6.0
March 1959	58,219	36.3	21,151	19,962	1,289	6.1
March 1957	56,967	35.8	20,409	19,569	840	4.1
October 1952	53,596	35.6	19,088	18,572	516	2.7

Source: End of Appendix D-3.

Appendix D-1 (cont'd)

	18 through 64 years			65 years and older		
	Population	Labor Force	Participation Rate %	Population	Labor Force	Participation Rate %
Both Sexes						
March 1962	99,600	64,689	64.9	17,230	3,299	19.1
March 1959	96,714	61,755	63.9	15,294	3,060	20.0
March 1957	94,775	60,235	63.6	14,681	3,257	22.2
October 1952	89,080	56,968	64.0	12,260	3,005	24.5
Male						
March 1962	48,111	42,693	88.7	7,710	2,241	30.3
March 1959	46,843	41,324	88.2	6,946	2,321	34.2
March 1957	45,735	40,687	89.0	6,754	2,477	37.5
October 1952	42,016	38,658	92.0	5,728	2,415	42.6
Female						
March 1962	51,489	21,996	42.7	9,520	911	9.9
March 1959	49,871	20,431	41.0	8,348	836	10.2
March 1957	49,040	19,548	39.9	7,927	813	10.5
October 1952	47,064	18,310	38.9	6,532	590	9.1

Source: End of Appendix D-3.

Civilian Population and Labor Force Data by Education and Sex: 1952, 1957, 1959 and 1962

number in 000's

8 or Less Years of Education

18 years and older

	Employed		Unemployed		Labor Force		Unemployment	
	Number	% of Total	Number	% of Total	Number	% of Total	Rate %	Structure %
Both Sexes								
March 1962	16,880	26.4	1,466	36.2	18,396	27.1	8.0	133
March 1959	18,058	29.7	1,670	41.6	19,728	30.4	8.5	137
March 1957	20,035	32.9	1,209	46.6	21,244	33.5	5.7	139
October 1952	22,358	37.5	462	40.7	22,820	37.6	2.0	105
Male								
March 1962	12,192	28.8	1,112	41.5	13,304	29.6	8.4	140
March 1959	13,191	32.3	1,237	45.4	14,428	33.1	8.6	137
March 1957	14,754	35.7	893	50.9	15,647	36.3	5.7	139
October 1952	16,608	40.4	320	51.8	16,928	40.6	1.9	127
Female								
March 1962	4,667	21.6	350	25.2	5,017	21.8	7.0	117
March 1959	4,911	24.5	433	33.6	5,344	25.3	8.1	133
March 1957	5,225	26.7	314	37.4	5,539	27.1	5.7	139
October 1962	5,750	31.0	142	27.5	5,892	30.9	2.4	89

Source: End of Appendix D-3.

8 or Less Years of Education (cont'd)

	18 years and older			18 through 64 years			
			Participation				Participation
	Population	Rate %	Structure %	Population	Labor Force	Rate %	Structure %
Both Sexes							
March 1962	37,890	48.6	84	26,372	16,496	62.3	96
March 1959	38,242	51.6	89	28,212	17,847	63.3	99
March 1957	39,925	53.2	92	30,117	19,155	63.6	100
October 1952	40,630	56.2	94	31,980	20,736	64.8	101
Male							
March 1962	18,986	70.1	87	13,644	11,954	87.6	99
March 1959	19,364	74.5	92	14,592	13,017	89.2	101
March 1957	20,294	77.1	94	15,569	14,037	90.2	101
October 1952	20,486	82.6	95	16,226	15,193	93.6	102
Female							
March 1962	18,904	26.5	70	12,728	4,531	35.6	83
March 1959	18,878	28.3	78	13,620	4,883	35.9	88
March 1957	19,631	28.2	79	14,548	5,043	34.7	87
October 1952	20,144	29.2	82	15,754	5,530	35.1	90

Source: End of Appendix D-3.

Appendix D-2 (cont'd)

Over 8 but Less than 12 Years of Education

18 years and older

	Employed		Unemployed		Labor Force		Unemployment	
	Number	% of Total	Number	% of Total	Number	% of Total	Rate %	Structure %
Both Sexes								
March 1962	12,084	18.9	1,085	26.8	13,169	19.4	8.2	137
March 1959	11,760	19.4	1,088	27.1	12,849	19.8	8.5	137
March 1957	11,631	19.1	628	24.2	12,259	19.3	5.1	125
October 1962	10,960	18.4	262	23.1	11,222	18.5	2.3	123
Male								
March 1962	8,128	19.2	689	25.7	8,817	19.6	7.8	130
March 1959	8,086	19.8	711	26.1	8,797	20.2	8.1	129
March 1957	8,018	19.4	400	22.8	8,418	19.5	4.8	117
October 1952	7,622	18.6	124	20.1	7,746	18.6	1.6	108
Female								
March 1962	3,911	18.1	397	29.0	4,308	18.7	8.8	147
March 1959	3,673	18.4	379	29.4	4,052	19.2	9.4	154
March 1957	3,620	18.5	228	27.1	3,848	18.9	5.9	144
October 1952	3,338	18.0	138	26.7	3,476	18.2	4.0	168

Source: End of Appendix D-3.

Over 8 but Less than 12
  Years of Education (cont'd)

	18 years and older			18 through 64 years			
		Participation				Participation	
	Population	Rate %	Structure %	Population	Labor Force	Rate %	Structure %
Both Sexes							
March 1962	21,682	60.7	104	19,865	12,679	63.8	98
March 1959	21,114	69.9	105	19,370	12,475	64.4	101
March 1957	20,422	60.0	103	18,909	11,927	63.1	99
October 1952	18,332	61.2	102	17,146	10,881	63.5	99
Male							
March 1962	10,233	86.2	107	9,475	8,539	90.1	102
March 1959	9,983	88.1	109	9,313	8,554	91.9	104
March 1957	9,593	87.8	107	8,986	8,178	91.0	102
October 1952	8,456	91.6	105	7,960	7,500	94.2	102
Female							
March 1962	11,449	37.6	100	10,390	4,135	39.8	93
March 1959	11,131	36.4	100	10,057	3,923	39.0	95
March 1957	10,829	35.5	99	9,923	3,734	37.6	94
October 1952	9,876	35.2	99	9,186	3,369	36.7	94

Source: End of Appendix D-3.

12 Years of Education

	Employed		18 years and older Unemployed		Labor Force		Unemployment	
	Number	% of Total	Number	% of Total	Number	% of Total	Rate %	Structure %
Both Sexes								
March 1962	20,716	32.4	1,122	27.7	21,838	32.1	5.1	86
March 1959	18,970	31.2	955	23.8	19,925	30.7	4.8	77
March 1957	18,208	29.9	558	21.5	18,766	29.6	3.0	72
October 1952	15,876	25.6	286	25.2	16,162	26.6	1.8	94
Male								
March 1962	12,319	29.1	614	22.9	12,933	28.7	4.7	78
March 1959	11,231	27.5	584	21.2	11,815	27.1	4.9	78
March 1957	10,952	26.5	339	19.3	11,261	26.1	3.0	73
October 1952	9,612	23.4	106	17.2	9,718	23.3	1.1	73
Female								
March 1962	8,384	38.8	508	37.1	8,892	38.7	5.7	95
March 1959	7,725	38.7	376	29.2	8,101	38.3	4.6	75
March 1957	7,241	37.0	219	26.1	7,460	36.6	2.9	71
October 1952	6,264	33.7	180	34.9	6,444	33.8	2.8	104

Source: End of Appendix D-3.

12 Years of Education (cont'd)

	18 years and older			18 through 64 years			
	Population	Participation Rate %	Structure %	Population	Labor Force	Participation Rate %	Structure %
Both Sexes							
March 1962	35,566	61.4	106	33,398	21,347	63.9	99
March 1959	32,321	61.6	106	30,761	19,576	63.6	100
March 1957	30,612	61.3	106	29,047	18,372	63.2	99
October 1952	26,256	61.6	103	25,032	15,837	63.3	99
Male							
March 1962	14,897	86.8	108	14,078	12,637	89.8	101
March 1959	13,362	88.4	109	12,784	11,612	90.8	103
March 1957	12,514	90.0	110	11,975	11,067	92.4	104
October 1952	10,440	93.1	107	9,976	9,510	95.3	104
Female							
March 1962	20,669	43.0	114	19,320	8,732	45.2	106
March 1959	18,958	42.7	118	17,976	7,968	44.3	108
March 1957	18,098	41.2	115	17,072	7,291	42.7	107
October 1952	15,816	40.7	114	15,056	6,354	42.2	109

Source: End of Appendix D-3.

Over 12 but Less Than 16
   Years of Education

18 years and older

	Employed		Unemployed		Labor Force		Unemployment	
	Number	% of Total	Number	% of Total	Number	% of Total	Rate %	Structure %
Both Sexes								
March 1962	6,969	10.9	271	6.7	7,240	10.7	3.7	62
March 1959	5,837	9.6	209	5.2	6,046	9.3	3.5	56
March 1957	5,298	8.7	158	6.1	5,456	8.6	2.9	71
October 1952	4,950	8.3	72	6.3	5,022	8.3	1.4	75
Male								
March 1962	4,487	10.6	186	7.0	4,673	10.4	4.0	67
March 1959	3,839	9.4	131	4.8	3,970	9.1	3.3	52
March 1957	3,472	8.4	98	5.6	3,570	8.3	2.7	66
October 1952	3,296	8.0	38	6.1	3,334	8.0	1.2	80
Female								
March 1962	2,485	11.5	82	6.0	2,567	11.2	3.2	53
March 1959	1,996	10.0	79	6.1	2,075	9.8	3.8	62
March 1957	1,820	9.3	61	7.3	1,881	9.2	3.2	78
October 1952	1,654	8.9	34	6.6	1,688	8.8	2.0	74

Source: End of Appendix D-3.

Over 12 but Less than 16 Years of Education (cont'd)

	18 years and older			18 through 64 years			
	Population	Rate %	Participation Structure %	Population	Labor Force	Rate %	Participation Structure %
Both Sexes							
March 1962	11,977	60.4	104	10,999	6,922	62.9	97
March 1959	10,074	60.0	104	9,324	5,805	62.3	98
March 1957	8,936	61.1	105	8,371	5,301	63.3	100
October 1952	8,398	59.8	100	7,902	4,842	61.3	96
Male							
March 1962	5,833	80.1	99	5,440	4,483	82.4	93
March 1959	4,935	80.4	100	4,633	3,802	82.1	93
March 1957	4,425	80.7	98	4,210	3,458	82.1	92
October 1952	3,896	85.6	98	3,708	3,209	86.5	94
Female							
March 1962	6,144	41.8	111	5,559	2,464	44.3	104
March 1959	5,139	40.4	111	4,691	2,002	42.7	104
March 1957	4,511	41.7	117	4,161	1,818	43.7	110
October 1952	4,502	37.5	105	4,194	1,648	39.3	101

Source: End of Appendix D-3.

16 or More Years of Education

18 years and older

	Employed		Unemployed		Labor Force		Unemployment	
	Number	% of Total	Number	% of Total	Number	% of Total	Rate %	Structure %
Both Sexes								
March 1962	7,353	11.5	109	2.7	7,462	109.8	1.46	24
March 1959	6,202	10.2	88	2.2	6,290	97.0	1.40	23
March 1957	5,785	9.5	42	1.6	5,827	91.8	0.72	18
October 1952	4,766	8.0	34	3.0	4,800	79.0	0.71	37
Male								
March 1962	5,207	12.3	75	2.8	5,282	11.7	1.4	23
March 1959	4,492	11.0	65	2.4	4,557	10.5	1.4	22
March 1957	4,091	9.9	25	1.4	4,116	9.6	0.6	15
October 1952	3,316	8.1	14	2.3	3,330	8.0	0.4	27
Female								
March 1962	2,161	10.0	33	2.4	2,194	9.5	1.5	25
March 1959	1,697	8.5	22	1.7	1,719	8.1	1.3	21
March 1957	1,663	8.5	17	2.0	1,680	8.2	1.0	24
October 1952	1,450	7.8	20	3.9	1,470	7.7	1.4	52

Source: End of Appendix D-3.

16 or More Years of
Education (cont'd)

	18 years and older			18 through 64 years			
	Population	Participation Rate %	Structure %	Population	Labor Force	Participation Rate %	Structure %
Both Sexes							
March 1962	9,715	76.8	132	8,966	7,180	80.1	123
March 1959	8,123	77.4	134	7,469	5,990	80.2	126
March 1957	7,637	76.3	132	7,029	5,542	78.8	124
October 1952	6,716	71.5	119	6,180	4,614	74.7	117
Male							
March 1962	5,872	90.0	112	5,474	5,080	92.8	105
March 1959	5,082	89.7	111	4,705	4,339	92.2	105
March 1957	4,572	90.0	110	4,205	3,906	92.9	104
October 1952	3,786	88.0	101	3,562	3,209	90.1	98
Female							
March 1962	3,843	57.1	152	3,492	2,134	61.1	143
March 1959	3,239	53.1	146	2,962	1,675	56.5	138
March 1957	3,065	54.8	153	2,824	1,642	58.1	146
October 1952	2,930	50.2	141	2,618	1,410	53.9	139

Source: End of Appendix D-3.

Appendix D-3

Participation Rates of Persons 65 Years of Age or Over by Educational Class

(in 000's)

	8 or Less Years of Education				9-12 Years of Education				13-16+ Years of Education			
	Popu- lation	Labor Force	Rate %	Structure %	Popu- lation	Labor Force	Rate %	Structure %	Popu- lation	Labor Force	Rate %	Struc- ture %
Both Sexes												
March 1962	11,518	1,900	16.5	86	3,985	981	24.6	126	1,727	600	34.7	182
March 1959	10,030	1,881	18.3	92	3,304	723	21.9	110	1,404	541	38.5	193
March 1957	9,808	2,089	21.3	96	3,078	726	23.6	106	1,173	440	37.5	169
October 1952	8,945	2,084	23.3	95	2,410	666	27.6	113	1,032	366	35.5	145
Male												
March 1962	5,342	1,350	25.3	84	1,577	574	36.4	120	721	392	49.6	164
March 1959	4,772	1,411	29.6	87	1,248	446	35.7	104	679	386	56.8	166
March 1957	4,725	1,610	34.1	91	1,146	434	37.9	101	582	322	55.3	148
October 1952	4,260	1,735	40.7	96	960	454	47.3	111	412	246	59.7	140
Female												
March 1962	6,176	486	7.9	80	2,408	333	13.8	139	936	163	17.4	176
March 1959	5,258	461	8.8	86	2,056	262	12.7	125	725	117	16.1	158
March 1957	5,083	496	9.8	93	1,932	283	14.6	139	591	101	17.1	163
October 1952	4,390	362	8.2	90	1,450	197	13.6	149	620	100	16.1	177

Source: Next page.

<u>Sources for Appendices D-1, D-2, and D-3</u>

Calculations made from data given in the following sources:

Population (D-1 and D-2): Department of Commerce, Bureau of the Census, <u>Current Population Reports: Population Characteristics</u>, Series P-20.

   No. 45: "School Enrollment, Educational Attainment, and Illiteracy, October 1952," Table 11, p. 18 (civilian noninstitutional)

   No. 77: "Educational Attainment: March 1957," Table 1, p. 9 (does include some Armed Forces)

   No. 99: "Literacy and Educational Attainment: March 1959," Table 1, p. 13 (includes 1,007,000 members of Armed Forces living with families)

   No. 121: "Educational Attainment: March 1962," Table 1, p. 7 (includes 978,000 members of Armed Forces living with families)

Labor Force, Employed and Unemployed (D-1 and D-2): Department of Commerce, Bureau of the Census, <u>Current Population Reports: Labor Force</u>, Series P-50, No. 49 "Educational Attainment of Workers: October 1952," Table 1, p.7.

Department of Labor, <u>Monthly Labor Review</u>, May 1963: "Educational Attainment of Workers, March 1962," Table 4, p. 507, for March 1957, 1959, and 1962.

_____, Bureau of Labor Statistics, <u>Special Labor Force Report No. 30</u>, "Educational Attainment of Workers, March 1962," Table A, p. A-5 (for 18 through 64 years).

65 years and over (D-1 and D-3): <u>Manpower Report of the President, 1963</u>, <u>op</u>. <u>cit</u>. Table A-2, p. 140 and Table A-8, p. 144 (totals), plus references above.

Note: Due to calculations and rounding sums may not equal totals. Many of the columns had to be calculated from percents to obtain absolute numbers.

Structure ≡ Group Rate/Total Rate
              100% means group rate = total rate.

Unemployment Structure by Years of School Completed: 1950
and 1960

(numbers in 000's)

	1950				1960				1960/1950
	Labor Force	Unemployment			Labor Force	Unemployment			Change in Structure
		Number	Rate %	Structure		Number	Rate %	Structure	
TOTAL	48,167	1,993	4.1	1.00	57,969	2,543	4.4	1.00	---
No school years completed	827	60	7.3	1.75	667	55	8.3	1.88	1.07
Less than 8	10,835	644	5.9	1.43	9,788	691	7.1	1.61	1.13
1-4	---	---	---	---	2,691	206	7.7	1.75	---
5-7	---	---	---	---	7,098	486	6.9	1.56	---
8 years	9,514	434	4.6	1.10	9,331	519	5.6	1.27	1.16
9-11	8,526	379	4.5	1.07	11,872	605	5.1	1.16	1.08
12	10,080	287	2.9	0.69	14,922	466	3.1	0.71	1.03
13-15	3,692	94	2.6	0.62	5,574	141	2.5	0.58	0.94
16 or more	3,766	54	1.4	0.35	5,815	66	1.1	0.26	0.74
16	---	---	---	---	3,275	43	1.3	0.30	---
17 or more	---	---	---	---	2,540	23	0.9	0.21	---

$$\frac{\text{Total Unemployment Rate, 1960}}{\text{Total Unemployment Rate, 1950}} = \frac{4.38}{4.14} = 105.8$$

Source: Manpower Report of the President, 1964, op. cit., Table G-13, p. 267.

Appendix D-5

White Male Labor Force Data by Age and Education:

1950 and 1960

(numbers in 000's)

35-44 Years Old

	Education	Population	Labor Force	Participation Rate %	Unemployed Number	Rate %
	Total	9,258	8,795	95.0	293	3.3
	0-7	1,758	1,630	92.7	86	5.3
	0-4	497	444	89.3	25	5.6
	5-7	1,261	1,186	94.1	61	5.1
	8	1,884	1,805	95.8	73	4.0
1950	9-11	1,894	1,829	96.6	64	3.5
	12	1,940	1,885	97.2	42	2.2
	13-15	732	708	96.7	13	1.8
	16+	804	785	97.6	8	1.0
	Total	10,319	9,920	96.1	332	3.3
	0-7	1,328	1,185	89.2	79	6.7
	0-4	382	313	81.9	23	7.3
	5-7	946	872	92.2	56	6.4
	8	1,364	1,296	95.0	67	5.2
1960	9-11	2,222	2,142	96.4	85	4.0
	12	3,098	3,031	97.8	70	2.3
	13-15	1,036	1,013	97.8	18	1.8
	16+	1,271	1,254	98.7	10	0.8

Source: See end of table.

45-54 Years Old

Education	Population	Labor Force	Participation Rate %	Unemployed Number	Rate %
1950					
Total	7,659	7,072	92.3	273	3.9
0-7	2,062	1,862	90.3	103	5.5
0-4	683	598	87.6	35	5.9
5-7	1,379	1,264	91.7	68	5.4
8	2,047	1,918	93.7	77	4.0
9-11	1,230	1,160	94.3	42	3.6
12	1,062	1,014	95.5	27	2.7
13-15	480	458	95.4	12	2.6
16+	542	523	96.5	7	1.3
1960					
Total	9,128	8,568	93.9	331	3.9
0-7	1,829	1,612	88.1	102	6.3
0-4	492	402	81.7	30	7.5
5-7	1,337	1,210	90.5	72	6.0
8	1,907	1,781	93.4	87	4.9
9-11	1,930	1,832	94.9	72	3.9
12	1,876	1,805	96.2	46	2.5
13-15	774	745	96.3	17	2.3
16+	813	792	97.4	8	1.0

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population, 1950, "Education," Special Report P-E, No. 5B (Washington, D.C.: Government Printing Office, 1953), Table 9, pp. 5B-73ff; _____, U.S. Census of Population, 1960, "Educational Attainment," Final Report PC(2)-5B (Washington, D.C.: Government Printing Office, 1963), Table 4, pp. 54ff. Whites = Total - Nonwhites.

1950-1960 Comparison of Participation and Unemployment Rates for White Males by Age and Education

		Participation Rates				Unemployment Rates		
			Age Group/Total				Age Group/Total	
Education	1960-1950	1950	1960	1960/1950	1960-1950	1950	1960	1960/1950
35-44 Years								
Total	1.1	1.00	1.00	---	0.0	1.00	1.00	---
0-7	-3.5	0.98	0.93	0.95	1.4	1.61	2.03	1.26
0-4	-7.4				1.7			
5-7	-1.9	0.99	0.96	0.97	1.3	1.55	1.94	1.25
8	-0.8	1.01	0.99	0.98	0.8	1.21	1.58	1.31
9-11	-0.2	1.02	1.00	0.98	0.5	1.06	1.21	1.14
12	+0.6	1.02	1.02	1.00	0.1	0.67	0.70	1.04
13-15	+1.1	1.02	1.02	1.00	0.0	0.55	0.55	1.00
16+	+1.1	1.03	1.03	1.00	-0.2	0.34	0.24	0.71
45-54 Years								
Total	-1.6	1.00	1.00	---	0.0	1.00	1.00	---
0-7	-2.2	0.98	0.94	0.96	0.8	1.41	1.62	1.15
0-4	-5.9				1.6			
5-7	-1.2	0.99	0.96	0.97	0.6	1.38	1.54	1.12
8	-0.3	1.02	0.99	0.97	0.9	1.03	1.26	1.22
9-11	+0.6	1.02	1.01	0.99	0.3	0.92	1.00	1.09
12	+0.7	1.03	1.02	0.99	-0.2	0.69	0.64	0.93
13-15	+0.9	1.03	1.03	1.00	-0.3	0.67	0.59	0.88
16+	+0.9	1.05	1.04	0.99	-0.3	0.33	0.26	0.79

Source: Appendix D-5.

BIBLIOGRAPHY

Books

Gardner Ackley, <u>Macroeconomic Theory</u> (New York: The Macmillan Company, 1961).

Kenneth E. Boulding, "The Death of the City: A Frightened Look at Postcivilization" in <u>The Historian and the City</u>, edited by Oscar Handlin and John Burchard (Cambridge: The M.I.T. and Harvard University Press, 1963).

Ewan Clague and Leon Greenberg, "Employment" in <u>Automation and Technological Change</u>, American Assembly, Columbia University (Englewood, N.J.: Prentice-Hall, Inc., 1962).

Thomas B. Curtis, <u>87 Million Jobs</u> (New York: Duell, Sloan, and Pearce, 1962).

Edward F. Dennison, <u>The Sources of Economic Growth in the United States and the Alternatives Before Us</u>, Supplementary Paper No. 13 (New York: Committee for Economic Development, 1962).

Edward F. Dennison, "Theoretical Aspects of Quality Change, Capital Consumption, and Net Capital Formation," <u>Problems of Capital Formation</u>, National Bureau of Economic Research, Studies in Income and Wealth, Volume 19 (Princeton, N.J.: Princeton University Press, 1957).

Edward F. Dennison, "Measuring the Contribution of Education (and the Residual) to Economic Growth," <u>The Residual Factor and Economic Growth</u>, (Paris: OECD, 1964).

Otto Eckstein, paper in <u>Unemployment and The American Economy</u>, A. M. Ross, editor (New York: Wiley, 1964).

<u>The Economic Almanac</u>, 1964 (New York: National Industrial Conference Board, 1964).

<u>Employment and Economic Growth</u>, (Geneva: International Labour Office, 1964).

R. A. Gordon, "Twenty Years of Economic and Industrial Change," <u>Space, Science and Life</u> (Washington, D.C.: National Aeronatuics and Space Administration, 1963).

Leon Greenberg, "Data Available for the Measurement of Output per Man-Hour," Output, Input, and Productivity Measurement, National Bureau of Economic Research, Studies on Income and Wealth, Volume 25 (Princeton, N.J.: Princeton University Press, 1961).

Frederick Harkinson and Charles A. Myers, Education, Manpower and Economic Growth (New York: McGraw-Hill Book Company, 1964).

Walter Heller, paper in Unemployment and the American Economy, A. M. Ross, editor (New York: Wiley, 1964).

A. J. Jaffee and C. D. Stewart, Manpower Resources and Utilization (New York: John Wiley & Sons, 1951).

John W. Kendrick, Productivity Trends in the United States, National Bureau of Economic Research (Princeton, N.J.: Princeton University Press, 1961).

Stanley Lebergott, Manpower in Economic Growth (New York: McGraw-Hill Book Company, 1964).

Clarence Long, The Labor Force Under Changing Income and Employment, National Bureau of Economic Research (Princeton, N.J.: Princeton University Press, 1958).

Fritz Machlup, The Production and Distribution of Knowledge in the United States (Princeton, N.J.: Princeton University Press, 1962).

Herman P. Miller, Rich Man, Poor Man (New York: Thomas Y. Crowell Company, 1964).

W. E. G. Salter, Productivity and Technical Change (Cambridge: University Press, 1960).

Theodore W. Schultz, The Economic Value of Education (New York: Columbia University Press, 1963).

Nestor E. Terleckyj, Research and Development: Its Growth and Composition, National Industrial Conference Board, Studies in Business Economics, No. 82 (New York, 1963).

Goodwin Watson, editor, No Room at the Bottom: Automation and the Reluctant Learner (Washington, D.C.: National Education Association, 1963).

W. S. Woytinsky and associates, Employment and Wages in the United States (New York: The Twentieth Century Fund, 1953).

Articles and Periodicals

Gardner Ackley vs. John I. Snyder, "Automation: Threat and Promise," The New York Times Magazine Section (March 22, 1964).

P. S. Anderson, "The Apparent Decline in Capital-Output Ratios," Quarterly Journal of Economics (November, 1961).

Gary S. Becker, "Investment in Human Capital: A Theoretical Analysis," Journal of Political Economy (Supplement, October 1962).

Ely M. Brandes, "Manpower Planning and The New Pariahs," The Reporter (March 26, 1964).

"The Challenge of Automation," Newsweek (January 25, 1965).

Edwin L. Dale, Jr., "The Great Unemployment Fallacy," The New Republic (September 5, 1964).

Edward F. Dennison, "Revised Estimates of Wages and Salaries in the National Income, 1929-1943," Survey of Current Business (June 1945).

Peter Drucker, "Automation is Not the Villain," New York Times Magazine (January 14, 1965).

Luther H. Foster and Charles E. Prothro, "Minimum Income Necessary to Maintain a Small Private College Effectively," The Journal of Negro Education, Vol. XXIX, No. 3 (Summer, 1960).

Joseph F. Fulton, "Employment Impact of Changing Defense Programs," Monthly Labor Review (May 1964).

L. E. Galloway, "Labor Mobility Resource Allocation, and Structural Unemployment," American Economic Review (September 1963).

Clayton Gehman, "Measuring and Analyzing Economic Growth," Federal Reserve Bulletin, Vo. 49, No. 8 (August 1963).

R. A. Gordon, "Has Structural Unemployment Worsened?" Industrial Relations (May 1964).

Statement by Leon Greenberg, Assistant Commissioner for Productivity and Technological Developments of the Bureau of Labor Statistics, The New York Times (March 16, 1964), p. 1.

W. Lee Hansen, "Total and Private Rates of Return to In-
     vestment in Schooling," Journal of Political Economy
     (April 1963).

Fred M. Hechinger's review of the problem of vocational
     education in The New York Times (April 4, 1965), p. E 9.

John N. Henderson, "Comparability of Estimates of the Indus-
     trial Distribution of Employment," Review of Economics
     and Statistics, Vol. XLIII, No. 1 (February 1961).

"How They See the Work Ahead," Business Week (January 9,
     1965).

James W. Knowles, "The Path of 1970," The Conference
     Board Record (November 1964).

Martin L. Marimont, "GNP by Major Industries," Survey of
     Current Business (October 1962).

Statement by George Meany, President of the A.F.L.-C.I.O.,
     The New York Times (March 20, 1964), p. 15.

Herman P. Miller, "Annual and Lifetime Income in Relation
     to Education, 1939-1954," American Economic Review,
     (December 1960).

"Mind Transfusion: Aid Project for Negro Professors Shows
     Extent of Past Neglect," The New York Times, (May 10,
     1964), p. E 9.

J. Roger Morrison and Richard F. Neuschel, "The Second
     Squeeze on Profits," Harvard Business Review (July-
     August, 1962).

Charles E. Silberman, "The Real News about Automation,"
     Fortune (January 1965).

N. J. Simler, "Long-Term Unemployment, the Structural
     Hypothesis, and Public Policy," American Economic Re-
     view (December 1964).

Kenneth Strand and Thomas Dernburg, "Cyclical Variation in
     Civilian Labor Force Participation," Review of Economics
     and Statistics (Nov. 1964).

The Wall Street Journal, editorial (February 27, 1964), p. 10.

Statement by Secretary of Labor Willard Wirtz, The New York
     Times (December 17, 1963), p. 41.

Public Documents

Gertrude Bancroft and Stuart Garfinkle, "Job Mobility in 1961," Special Labor Force Report No. 35 (Washington, D.C.: Bureau of Labor Statistics, 1963).

Economic Report of the President, 1962 (Washington, D.C.: Government Printing Office, 1962).

Economic Report of the President, 1964 (Washington, D.C.: Government Printing Office, 1964).

Economic Report of the President, 1965 (Washington, D.C.: Government Printing Office, 1965).

Richard S. Eckaus, "Education and Economic Growth," in Economics of Higher Education, Selma J. Mushkin (editor), U. S. Department of Health, Education, and Welfare (Washington, D.C.: Government Printing Office, 1962).

Manpower Report of the President, 1963 (Washington, D.C.: Government Printing Office, 1963).

Manpower Report of the President, 1964 (Washington, D.C.: Government Printing Office, 1964).

Jane L. Meredith, "Labor Force and Employment 1960-62," Special Labor Force Report No. 31 (Washington, D.C.: Bureau of Labor Statistics, 1963).

President's Committee to Appraise Employment and Unemployment Statistics, Measuring Employment and Unemployment (Washington, D.C.: Government Printing Office, 1962).

President's Task Force on Manpower Conservation, "One-Third of a Nation" (Washington, D.C.: Government Printing Office, 1964).

Theodore W. Schultz, "Rise in the Capital Stock Represented by Education in the United States, 1900-1957," in Economics of Higher Education, U.S. Department of Health, Education and Welfare, Office of Education (Washington, D.C.: 1962).

U.S. Board of Governors of the Federal Reserve System, Industrial Production, 1959 revision (Washington, D.C.: 1960).

U.S. Board of Governors of the Federal Reserve System, Industrial Production Indexes 1961-1963, (September 1964).

U.S. Congress, Joint Economic Committee, Subcommittee on Economic Statistics, 87th Congress, 1st Session, December 20, 1961 (Washington, D.C.: Government Printing Office, 1962).

U.S. Congress, Joint Economic Committee, Subcommittee on Economic Statistics, Higher Unemployment Rates, 1957-60: Structural Transformation or Inadequate Demand, 87th Congress, 1st Session (Washington, D.C.: Government Printing Office, 1961).

U.S. Congressional Record, Employment in the Dynamic American Economy, Republican Policy Committee of the House of Representatives (87th Congress, 1st sess., 1961).

U.S. Department of Commerce, Bureau of the Census, Current Population Reports: Labor Force, Series P-50, No. 49, "Educational Attainment and Literacy of Workers: October 1952."

U.S. Department of Commerce, Bureau of Census, Current Population Reports: Labor Force, Series P-57, No. 164 and No. 178: "The Monthly Report on the Labor Force: February 1956 and April 1957."

U.S. Department of Commerce, Bureau of the Census, Current Population Reports: Population Characteristics, "School Enrollment, Educational Attainment, and Illiteracy, October 1952," Series P-20, No. 45. "Educational Attainment: March 1957," Series P-20, No. 77. "Literacy and Educational Attainment: March 1959," Series P-20, No. 99. "Educational Attainment: March 1962," Series P-20, No. 121.

U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population 1950, "Industrial Characteristics," Special Report No. 10.

U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population 1950, Occupational Characteristics, Special Report P-E No. 18.

U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population 1960, "Educational Attainment," Final Report PC (2)-5B (Washington, D.C.: Government Printing Office, 1963).

U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population 1960, "Occupation by Industry," Final Report PC (2)-7C (Washington, D.C.: Government Printing Office, 1963).

U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population: 1960, U.S. Summary; General Social and Economic Characteristics; Final Report PC (1)-1C.

U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1963 (Washington, D.C.: Government Printing Office, 1963).

U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population, 1950, "Education," Special Report P-E, No. 5B (Washington, D.C.: Government Printing Office, 1953).

U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population: 1950, "Occupation by Industry," Special Report, P-E, No. 1C (Washington, D.C.: Government Printing Office, 1954).

U.S. Bureau of the Census, 1960 Census of Population, Classified Index of Occupations and Industries (Washington, D.C.: Government Printing Office, 1960).

U.S. Department of Commerce, Office of Business Economics, National Income: 1954 edition (Washington, D.C.: Government Printing Office, 1954).

U.S. Department of Commerce, Office of Business Economics, U.S. Income and Output (Washington, D.C.: Government Printing Office, 1958).

U.S. Department of Health, Education, and Welfare, Trends, 1963 (Washington, D.C.: Government Printing Office, 1963).

U.S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 1345-83, Wages and Related Benefits, Part II (Washington, D.C.: June 1964).

U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings for the United States, 1909-64, bulletin no. 1312-2 (Washington, D.C.: Government Printing Office, December 1964).

U.S. Department of Labor, Bureau of Labor Statistics, Special Labor Force Report No. 30, "Educational Attainment of Workers, March 1962" (Washington, D.C.: Government Printing Office, 1963).

U.S. Department of Labor, Monthly Labor Review, May 1963 "Educational Attainment of Workers, March 1962."

U.S. Department of Labor, Bureau of Labor Statistics, "Trends in Output per Man-Hour in the Private Economy, 1909-1958," (Washington, D.C.: Government Printing Office, 1959).

U.S. Senate, Committee on Labor and Public Welfare, Nation's Manpower Revolution, Hearings Before the Subcommittee on Employment and Manpower, 88th Congress, Second Session, (Washington, D.C.: Government Printing Office, 1964).

U.S. Senate, Committee on Labor and Public Welfare, Subcommittee on Employment and Manpower. See Lessons from Foreign Labor Market Policies, Volume 4 and The Role of Apprenticeship in Manpower Development: United States and Western Europe, Volume 3 of Selected Readings in Employment and Manpower, 88th Congress, 2nd Session (Washington, D.C.: Government Printing Office, 1964).

U.S. Senate, Special Committee on Unemployment in Unemployment Problems, 86th Cong., 1st Sess. (Washington, D.C.: Government Printing Office, October 1959).

Other Documents
and Unpublished Material

Gardner Ackley, "Our National Economy: Present Situation and Outlook," address before the Vermont-New Hampshire School of Banking, Hanover, New Hampshire, September 8, 1963.

Study of educational attainment and achievement of eighth grade Negro pupils. This study was received in personal correspondence with Harold M. Barron, Director of the Research Department, The Chicago Urban League.

George Delehanty, An Analysis of the Changing Proportion of Nonproductive Workers in U.S. Manufacturing Industries, Unpublished M.I.T. Ph.D. Thesis, 1962.

Victor R. Fuchs, "Productivity Trends in the Goods and Service Sectors, 1929-61: A Preliminary Survey," Occasional Paper No. 89 (New York: National Bureau of Economic Research, 1964).

W. H. Gruber, New Standards for the American Economy, M.I.T. Sloan School of Management Working Paper 44-64, January 1964.

George H. Hildebrand, "Some Alternative Views of the Current Unemployment Problem in the United States," Unpublished monograph, 1964.

C. C. Killingsworth, paper read at a Conference on Employment Security at Michigan State University, October 26, 1963.

Samuel M. Nabrit, Stephen White, and Jerrold K. Zacharias, "Program for Negro Colleges," Unpublished monograph dated August 1, 1963.

Arthur Okun, "Potential GNP: Its Measurement and Significance," Proceedings of the Business and Economics Section of the American Statistical Association, 1962.

"Platform Proposals of the AFL-CIO to the Republican and Democratic Conventions, 1964."

Robert M. Solow, "The Nature and Sources of Unemployment in the United States," The 1964 Wicksell Lectures distributed by Almqvst and Wiksell, Stockholm.

Statement of Secretary of Labor Wirtz published in the "Proceedings of a Symposium on Employment," sponsored by the American Bankers Association on February 24, 1964.