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UNIVERSITY OF ILLINOIS BULLETIN

ISSUED WEEKLY

Vol. XXIV

MAY 31, 1927

No. 39

[Entered as second-class matter December 11, 1912, at the post office at Urbana, Illinois, under the Act of August 24, 1912. Acceptance for mailing at the special rate of postage provided for in section 1103, Act of October 3, 1917, authorized July 31, 1918.]

BULLETIN NO. 35

BUREAU OF EDUCATIONAL RESEARCH
COLLEGE OF EDUCATION

THE CONSTANT AND VARIABLE OCCUPATIONS OF THE UNITED STATES IN 1920

By

R. H. OJEMANN

Assistant, College of Education



PRICE 25 CENTS

PUBLISHED BY THE UNIVERSITY OF ILLINOIS, URBANA
1927

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PREFACE

The study reported in this bulletin is a repetition and an elaboration of an earlier one by Leonard P. Ayres. New data, however, have been used and the comparisons thus made possible indicate the trend of constant and variable occupations. This information, as well as the facts relative to the various occupations, should be helpful in considering the problems of vocational education.

The study was financed by the Bureau of Educational Research, but in a very true sense it is the product of Mr. Ojemann's own labors. The Director welcomes the opportunity to include this bulletin in the list of the publications of the Bureau of Educational Research.

WALTER S. MONROE, *Director*

April 4, 1927.



THE CONSTANT AND VARIABLE OCCUPATIONS OF THE UNITED STATES IN 1920

CHAPTER I

INTRODUCTION

An important problem in the administration of vocational education in the secondary school is the selection of the occupations which should be represented by the corresponding vocational subjects in the secondary-school curriculum. In making this selection, some school systems have given considerable emphasis to the results of the surveys of local communities.¹ Careful consideration will show, however, that a study of the local conditions cannot furnish all the data that are necessary to make an intelligent selection. There are many principles that must be taken into consideration, and many of these principles require data not furnished by the local survey. For example, Inglis² lists as one of these principles the following: "Only those occupations which have a fairly steady and general demand for skilled workers should be represented by related vocational subjects in the secondary school. No school can afford to introduce vocational subjects when the occupations for which they prepare vary widely in the rate of demand for workers thus prepared."

Hence it is important that we know the rate of demand for workers in the various occupations in places where men live together in large numbers. If there are certain occupations which offer opportunity for employment to a considerable number of workers everywhere, we should know what these occupations are. On the other hand, if there are certain occupations which offer employment to a considerable number of workers in some communities and not in others, we should know what they are.

Several studies have been made in an attempt to supply this information. Some of these studies have been state-wide; others have been nation-wide. The best known nation-wide study is that of Ayres³ re-

¹The term "community" here refers to an area bounded by corporate limits such as a city, town, or school district.

²INGLIS, ALEXANDER. *Principles of Secondary Education*. Boston: Houghton Mifflin Company, 1918, p. 581.

³AYRES, L. P. "Constant and variable occupations and their bearing on problems of vocational education." Russell Sage Foundation, Division of Education, Pamphlet Publication E 136. New York: Russell Sage Foundation, 1914. 11 p.

ported in 1914 and based on data furnished by the 1900 census. Since several significant social and economic changes have taken place since that time, it appeared advisable to conduct another nation-wide survey. This study represents such an attempt.

Statement of the problem. The specific questions to be considered are the following:

1. What are the facts at the present time relative to the number of workers employed in the different occupations in the various communities?

2. How do these facts compare with those obtained by Ayres in his study of the 1900 Census, and what are the reasons for the differences?

3. What is the significance for education of the facts obtained in the answers to the above two questions?

Definition of terms. The three questions just stated contain several terms that demand definition.

1. "At the present time"—The data for this study were taken from the 1920 Census of the United States and the term "at the present time," when used in the statement of the problem, will refer, therefore, to the year 1920.

2. "Occupations"—The classification of occupations used in this study is the same as that of the 1920 Census with the exception of certain changes consisting of omissions and groupings. In making these groupings and omissions, two general principles were followed: first, occupations for which the training is similar were combined into one group; second, occupations for which little or no training is necessary were omitted. The application of these two principles to the 1920 Census occupational classification resulted in 123 groups of occupations. A list of these occupations will be found in the Appendix.

3. "Community"—In the subsequent discussion, the term "community" will be used to refer to a city in the United States which had between twenty-five thousand and one hundred thousand population in 1920. There were 219 such cities, and all but one were included in this study. Hamtramck Village, Michigan, was excluded. This city, located about five miles northeast of Detroit, increased its population more than thirteen times in the period 1910-1920. The reason for this enormous increase is found in the tremendous development of the automobile industry in the vicinity of Detroit. Hamtramck Village represents a very unusual situation and was therefore excluded.

4. "Number of workers employed"—In the previous studies the term "constant" was applied to an occupation if it was represented by at least ten workers per ten thousand population in all the communities

studied. Correspondingly the term "less constant" was applied to an occupation if it was represented by at least one worker per ten thousand population in each of the communities studied, but did not qualify as a "constant" occupation. The term "variable" was used to designate those occupations which were not represented by at least one worker per ten thousand population in all the communities studied. In the present study, this terminology will be retained, and the occupations will be classified as "constant," "less constant," and "variable" groups according to the criteria outlined above.

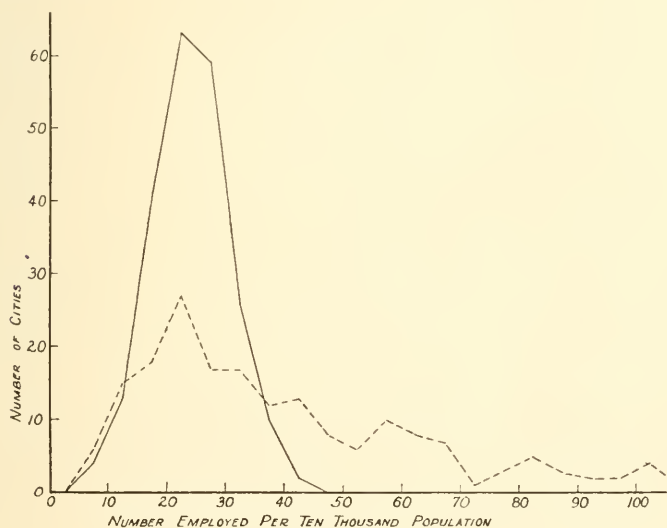


CHART I.

Graphic representation of the variability in employment for two "less constant" occupations. The solid line represents the distribution of the proportion of "barbers"; the broken line, "semi-skilled operatives in other industries."

There is, however, another characteristic of occupations to be considered. An occupation is designated as "constant" if it is represented by at least ten workers per ten thousand inhabitants. This definition restricts the meaning of the term "constant" considerably. The fact that an occupation is represented in all communities by ten or more workers per ten thousand inhabitants does not insure that the proportion of workers employed does not vary greatly from community to community. It is conceivable, for example, that an occupation represented by at least ten workers per ten thousand inhabitants and hence classified as a "constant" occupation might vary greatly in the number

of workers employed per ten thousand inhabitants from one community to another, while an occupation falling in the "less constant" group might vary to a far lesser extent.

Some of the "less constant" occupations exhibit a great range of variation. Chart I shows the distribution among the 218 cities studied of the ratios of the number of workers employed per ten thousand population for two "less constant" occupations. It can easily be seen that "barbers" varies less from one community to another than "semi-skilled operatives in other industries." Hence some measure is needed by which we can compare the variability of the different occupations.

By comparing a measure of the variability of a distribution with a measure of central tendency of the same distribution, it is possible to secure a measure by which the variability of distributions having averages that are widely different can be compared. The measure of relative variability that was employed for the purposes of this study is:

$\frac{D}{\text{Median}}$ in which $D = P_{90} - P_{10}$. This measure was chosen because it

takes into consideration more cases than Q (quartile range) and excludes the extreme cases which would be included if the total range were used. The calculation of P_{10} , P_{90} , and median will be described later.

Source and treatment of the data. As already indicated, data relative to occupations were taken from Table XX of Volume IV, Chapter II of the Fourteenth Annual Census of the United States. The population for each of the 218 cities was taken from Volume I of the Fourteenth Annual Census. The data of Table XX of Volume IV, Chapter II of the Census Reports were transferred to large data sheets and the number of workers per ten thousand population for the 123 occupations in the 218 cities was calculated to the second decimal place. These ratios with the names of the corresponding cities were arranged in descending numerical order on separate sheets for each occupation, and from these sheets the data for the tables reported in this study were taken. The twenty-second case was taken as P_{10} ; the one hundred tenth case was taken as the median; and the one hundred ninety-sixth case was taken as P_{90} .

The data from Ayres' study were taken from Pamphlet Publication No. E136 of the Division of Education of the Russell Sage Foundation.

Restatement of the problem. We are now ready to state our problem in more specific terms:

1. What are the "constant" occupations for men, that is, those offering employment to ten or more workers per ten thousand inhabitants in the 218 cities of the United States having a population between twenty-five thousand and one hundred thousand in 1920?

2. How does this list of "constant" occupations for men compare with Ayres' "constant" occupations in 1900?

3. What is the relative variability of the "constant" occupations for men?

4. What are the "less constant" occupations for men?

5. How does this list of "less constant" occupations compare with Ayres' "less constant" occupations of 1900?

6. What is the relative variability of the "less constant" occupations?

7. What is the relative variability of the "variable" occupations for men?

8. What are the "constant" occupations for women?

9. How does this list of "constant" occupations compare with Ayres' "constant" occupations for women?

10. What is the relative variability of "constant" occupations for women?

11. What are the "less constant" occupations for women?

12. How does this list of "less constant" occupations compare with Ayres' list of 1900?

13. What is the relative variability of the "less constant" occupations for women?

14. What is the relative variability for the "variable" occupations for women?

15. What is the significance of the data obtained in answering the above questions?

In the subsequent treatment the first three questions will be considered in Chapter II; the next three, in Chapter III; question 7, in Chapter IV; questions 8, 9, and 10, in Chapter V; questions 11-14, in Chapter VI; and the answer to question 15 together with a summary will be given in Chapter VII.

Accuracy of the data. The numerical data used in this report are subjected to two errors, those involved in preparing the Census Reports and those involved in the subsequent treatment. Various methods of re-checking were used in the subsequent treatment, so that the errors com-

ing from the latter source are judged to be negligible. As for errors coming from the former source, it is of course possible to judge only from the results secured. The writer is inclined to believe, however, that the errors involved in preparing the Census Reports are within the limits of accuracy required by this study.

CHAPTER II

THE "CONSTANT" OCCUPATIONS FOR MEN

The "constant" occupations in 1920. We have defined a "constant" occupation as one which offers employment to ten or more workers per ten thousand inhabitants in each community studied. We have also defined the term "community" as referring to any one of the 218 cities of the United States having a population between twenty-five thousand and one hundred thousand in 1920. The "constant" occupations for 1920 are given in Table I. They are listed in the descending order of the proportion of workers in the median city. Table I shows that there were twelve "constant" occupations for men in 1920.

Inspection of Table I reveals another interesting fact. The differences between the ratios for the lowest city and the highest city in any one occupation are in most cases large. This would tend to show that there is considerable variation in the proportion employed from one community to another. Upon first thought, this may appear surprising. We must bear in mind, however, that there are many factors that determine the number of workers employed in any one occupation in a given city, and "total population" is only one of these. What we need is some measure by which we can compare the variability in the proportions employed in one occupation with the variability in another. As we pointed out in Chapter I, we shall supply this measure in the form of the coefficient of variability a little later in this chapter.

Comparison with Ayres' "constant" occupations in 1900. For the convenience of the reader, Ayres' "constant" occupations are listed in Table II. The comparison of the two lists of "constant" occupations is made somewhat difficult by the fact that the Census Bureau made some changes in the occupational classification in 1910. As a result of these changes, the composition of some of the occupational groups was changed to such an extent that comparison between them is rendered impossible. This is true of the "steam railroad men," "engineers," and "street railway men" which appear in the 1900 list, and "machinists," "metal workers," "managers and superintendents (manufacturing)," and "clerks" which appear in the 1920 list. In addition to these changes in composition, the group "laborers" was omitted from the present study.

TABLE I.—THE "CONSTANT" OCCUPATIONS FOR MEN IN 1920

Occupation	Lowest City		Median City		Highest City	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Retail dealers.....	Flint, Mich.....	97	York, Pa.....	151	Chelsea, Mass.....	276
Machinists.....	Austin, Tex.....	25	Revere, Mass.....	146	Highland Park, Mich.....	664
Clerks (except clerks in stores)	Lewiston, Me.....	54	Warren, O.....	138	E. Orange, N. J.....	308
Metal Workers.....	Petersburg, Va.....	11	Niagara Falls, N. Y.....	134	New Britain, Conn.....	744
Carpenters and cabinet-makers.....	Brooklinton, Mass.....	36	Jackson, Mich.....	125	Newport News, Va.....	361
Salesmen.....	Chicopee, Mass.....	23	Kokomo, Ind.....	102	Oak Park, Ill.....	254
Managers and superintendents (mfg.).....	Altoona, Pa.....	17	Fort Wayne, Ind.....	57	East Cleveland, O.....	255
Accountants.....	East Chicago, Ind.....	12	Terre Haute, Ind.....	55	Tulsa, Okla.....	178
Draymen.....	Oak Park, Ill.....	14	Kokomo, Ind.....	50	Wichita Falls, Tex.....	165
Painters.....	East Chicago, Ind.....	13	New Brunswick, N. J.....	45	Kenosha, Wis.....	101
Plumbers.....	Muskogee, Okla.....	14	Holyoke, Mass.....	31	Bayonne, N. J.....	89
Electricians.....	Winston-Salem, N. C.....	13	San Jose, Cal.....	31	Gary, Ind.....	81

TABLE II.—THE "CONSTANT" OCCUPATIONS FOR MEN IN 1900

Occupation	Lowest City		Median City		Highest City	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Laborers.....	Lynn, Mass.....	138	Syracuse, N. Y.....	373	Seattle, Wash.....	801
Merchants, retail.....	Scranton, Pa.....	83	Louisville, Ky.....	146	Los Angeles, Cal.....	230
Clerks.....	Lawrence, Mass.....	56	Cambden, N. J.....	146	Washington, D. C.....	413
Draymen.....	Harrisburg, Pa.....	69	Bridgeport, Conn.....	124	Memphis, Tenn.....	236
Salesmen.....	Wilmington, Del.....	57	Albany, N. Y.....	118	Somerville, Mass.....	234
Carpenters.....	Cincinnati, O.....	68	Paterson, N. J.....	113	Seattle, Wash.....	233
Steam R. R. Men.....	New Bedford, Mass.....	22	Salt Lake City, U.....	109	Harrisburg, Pa.....	493
Machinists.....	Duluth, Minn.....	24	New Bedford, Mass.....	79	Elizabeth, N. J.....	349
Painters.....	Pittsburgh, Pa.....	37	St. Paul, Minn.....	66	Dayton, O.....	99
Bookkeepers.....	Lowell, Mass.....	20	Columbus, O.....	59	Omaha, Neb.....	99
Waiters.....	Manchester, N. H.....	12	Columbus, O.....	56	Seattle, Wash.....	238
Engineers.....	Atlanta, Ga.....	25	New York, N. Y.....	48	Duluth, Minn.....	164
Printers.....	Fall River, Mass.....	14	Louisville, Ky.....	40	Washington, D. C.....	102
Blacksmiths.....	New York, N. Y.....	21	Bridgeport, Conn.....	36	Wilmington, Del.....	65
Masons.....	San Francisco, Cal.....	15	Cleveland, O.....	35	St. Joseph, Mo.....	63
Barbers.....	Fall River, Mass.....	21	Oakland, Cal.....	29	Kansas City, Mo.....	43
Plumbers.....	New Orleans, La.....	13	Lowell, Mass.....	29	Albany, N. Y.....	55
Street R. R. Men.....	Manchester, N. H.....	12	Columbus, O.....	26	St. Louis, Mo.....	59
Shoemakers.....	Des Moines, Ia.....	11	Springfield, Mass.....	23	Lynn, Mass.....	922
Bakers.....	Kansas City, Kans.....	10	St. Joseph, Mo.....	22	Hoboken, N. J.....	37

The changes in the composition of the remaining occupations of Table I and Table II are small enough to permit comparison. For example, in 1900 the group "blacksmiths" included "blacksmiths and apprentices." In 1920, this group did not include apprentices. However, in 1900, out of the 226,000 "blacksmiths" in the United States, only 8,000 were apprentices. This number is not significant in the comparisons we are about to make.

There is another element that we must bear in mind in making these comparisons. Ayres' study included cities having a population of fifty thousand and over in 1900. The present study includes cities having twenty-five thousand to one hundred thousand population in 1920. The extension of the lower limit in the size of the city tends to include cities that differ more from one another in the composition of their working population. For example, in Table I, we see that the proportion of "woodworkers" in the lowest city is 36 workers per ten thousand population, and in the highest city, 361. If we include only cities having fifty thousand to one hundred thousand population, the proportion of "woodworkers" becomes, in the lowest city, 60, and in the highest city, 249. Thus, by excluding the cities of twenty-five thousand to fifty thousand population, we decrease the range in the proportion of workers from the lowest to the highest city by 136 points. The amount of the change in the range varies. In some occupations it is very small. In others, as in the case of "woodworkers," the difference is quite large. The point that we must bear in mind is that one of the factors that might be responsible for a greater range from the lowest to the highest city in the present study as compared with Ayres' study is the difference in the size of the cities that we are studying.

A detailed study of the occupations listed in Tables I and II, for which comparison is possible, gives the following results:

1. Since 1900 there has been no great change in the proportion of "retail merchants," "carpenters and cabinet makers," and "salesmen."
2. There has been a considerable decrease in the proportion of men employed as "draymen."
3. There appears to have been a slight decrease in the proportion of "painters."
4. There has been no great change in the proportion of "accountants." The proportion in the highest city was considerably higher in 1920 than in 1900, but the proportion in the median city was about the same.
5. There has been no great change in the proportion of "plumbers."

6. There has been such a large decrease in the proportion employed in the occupations of "waiters," "printers," "blacksmiths," "masons," "barbers," "shoe makers," and "bakers" since 1900 that they do not classify as "constant" occupations in the present study. This holds true even if we allow for the difference in the size of the city by considering only those cities having between fifty thousand and one hundred thousand population.

7. The occupation of "electricians" has shown sufficient increase in the proportion employed that it appears as a "constant" occupation in the present study. In 1900 it appeared in the "less constant" group.

Reasons for the differences. We have just seen that even if we allow for the differences in the Census occupational classification and for the difference in the size of the city studied, there are certain significant changes that have taken place among the "constant" occupations during the period 1900-1920. For any one of these changes, there are probably many factors that have contributed, but we can point out some that have played a significant part. We shall restrict our number to three:

1. One of the important factors is the invention of machinery to take the place of workers. This is probably the most potent factor responsible for the absence of "printers" from Table I. It also probably contributed to the disappearance of "shoe makers" and "bakers" from the list of "constant" occupations.

2. A second factor that has been responsible in part for the changes in occupations is the centralizing tendency manifested in certain industries. This factor accounts in part for the absence of "bakers" from the 1920 list of "constant" occupations.

3. A third factor that may account for some of these changes is the development of new products to take the place of old ones. This factor has been responsible for the disappearance of "blacksmiths" and "masons" from the list of "constant" occupations and for the appearance of "electricians."

Relative variability of the "constant" occupations. When we first observed the figures given in Table I, we noticed that the range from the proportion in the lowest city to the proportion in the highest city was rather large in some cases. As we have pointed out before, we must know the value of the coefficient of variability of the occupations in order that we may have a better idea of the variation in the proportion employed in the communities under consideration. The values of this coefficient for the "constant" occupations are given in Table III. Glanc-

TABLE III.—THE RELATIVE VARIABILITY COEFFICIENTS OF THE
“CONSTANT” OCCUPATIONS FOR MEN

Occupation	P ₁₀	P ₉₀	D (P ₉₀ - P ₁₀)	Median	D Median
Retail dealers.....	120	197	77	151	.51
Machinists.....	60	353	293	146	2.00
Clerks (except clerks in stores)	90	208	118	138	.85
Metal workers.....	25	444	419	134	3.12
Carpenters and cabinet makers.....	81	188	107	125	.85
Salesmen.....	57	169	112	102	1.10
Managers and superinten- dents (mfg.).....	32	86	54	57	.94
Accountants.....	31	90	59	55	1.07
Draymen.....	29	73	44	50	.88
Painters.....	30	64	34	45	.75
Plumbers.....	20	51	31	31	1.00
Electricians.....	19	47	28	31	.90

ing through the last column of the table, we see that all but two of the occupations have a coefficient of variability that is relatively small. However, since we do not know the value of this coefficient for any of the other occupations, we must defer our final interpretation until we have considered the “less constant” and “variable” groups. For the present, we may conclude that all but two of the “constant” occupations do not vary greatly, relatively, in the proportion employed from community to community. The variation in the proportion employed is greatest in the case of “metal workers” and next in the case of “machinists.”

Summary of the “constant” occupations for men. We have noted several interesting facts in regard to the “constant” occupations for men. We have seen that since 1900 some have disappeared from the list, some have shown a moderate decrease in the proportion employed, some have shown only a slight decrease, new ones have appeared, and some have shown no change.

In the group that has shown no change we find “retail merchants,” “salesmen,” “carpenters,” “plumbers,” and “accountants.” “Draymen” have decreased moderately, while “painters” have decreased only slightly.

It was interesting to note the increase in “electricians.”

We have also learned that “printers,” “waiters,” “blacksmiths,” “masons,” “barbers,” “shoemakers,” and “bakers” were absent from the 1920 list of “constant” occupations although they were found in the 1900 list. This fact is noteworthy. The decrease is not due to the difference in the size of the community studied in the two surveys but appears to be the result of the changes in our social and industrial life.

Finally we have seen that of all the "constant" occupations for 1920, those of "metal workers" and "machinists" are the most variable in the proportion employed among the different cities.

Comparatively few of the occupations that we find in every city are reported as belonging to the "constant" group. Such common occupations as "physicians," "lawyers," "clergymen," and so forth, are absent from the list. Just what the facts are relative to these occupations we shall see in the next chapter.

CHAPTER III

THE "LESS CONSTANT" OCCUPATIONS FOR MEN

The "less constant" occupations in 1920. We have defined a "less constant" occupation as one which offers employment to at least one worker per ten thousand inhabitants in all the communities studied, but which does not qualify as a "constant" occupation. The "less constant" occupations for 1920 are given in Table IV. The occupations are listed in the descending order of the proportion of workers in the median city. As we see in the table, there were forty-nine occupations that qualified as "less constant" for men in 1920.

Comparison with Ayres' "less constant" occupations. Ayres' list of "less constant" occupations is given in Table V. In making the comparison of Ayres' list with the list in Table IV, we must bear in mind the restrictions that we pointed out in Chapter II. The first restriction is that the Census classification of occupations was changed in 1910, and several of the groupings differ in composition to such an extent that comparison is not possible. This is true of such groups as "foremen and overseers (manufacturing)," "semi-skilled operatives in other industries," "brakemen and conductors," "mechanics," "firemen (not fire department)," "clerks in stores," and so forth. The second restriction to which our comparison is subjected is the difference in the size of the city considered in the 1920 and 1900 studies. Ayres studied the cities having a population of fifty thousand or more. The present study was made of cities having between twenty-five thousand and one hundred thousand population.

In order to summarize the results of the detailed study of Tables IV and V, we shall divide the occupations for which comparison is possible into four groups:

1. Occupations that showed no significant change in the proportion of workers employed:

- Commercial travelers
- Lawyers
- Clergymen
- Wholesale dealers
- Dentists
- Photographers

TABLE IV.—THE "LESS CONSTANT" OCCUPATIONS FOR MEN IN 1920

Occupation	Lowest City		Median City		Highest City	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Foremen and overseers (mfg.).	Austin, Tex.	6	Duluth, Minn.	49	Highland Park, Mich.	148
Semi-skilled operatives in other industries.	Johnstown, Pa.	7	Stockton, Cal.	38	Chicopee, Mass.	422
Servants and waiters.	Sheboygan, Wis.	5	Norwalk, Conn.	37	Atlantic City, N. J.	494
Brakemen and conductors.	East Chicago, Ind.	5	Charleston, S. C.	36	Harrisburg, Pa.	253
Chauffeurs.	Lorain, O.	3	St. Joseph, Mo.	32	Brooklinetown, Mass.	141
Mechanics.	Amsterdam, N. Y.	9	Atlantic City, N. J.	31	Phoenix, Ariz.	106
Firemen (not fire dept.).	Pasadena, Cal.	4	Lawrence, Mass.	31	Harrisburg, Pa.	98
Stationary engineers.	Lewiston, Me.	6	Fort Wayne, Ind.	30	Lorain, O.	153
Clerks in stores.	Decatur, Ill.	9	Danville, Ill.	29	Bangor, Me.	72
Commercial travelers.	Perthamboy, N. J.	2	Savannah, Ga.	28	Sioux Falls, S. Dak.	143
Blacksmiths.	Oak Park, Ill.	5	Chatanooga, Tenn.	24	Moline, Ill.	101
Barbers.	Brooklinetown, Mass.	5	Cedar Rapids, Ia.	24	Phoenix, Ariz.	43
Printers.	East Chicago, Ind.	3	Rockford, Ill.	22	Revere, Mass.	124
Agents, collectors.	East Chicago, Ind.	4	Colombia, S. C.	22	Oak Park, Ill.	98
Janitors.	West Hoboken town, N. J.	6	Holyoke, Mass.	22	Evanston, Ill.	73
Insurance agents.	East Chicago, Ind.	7	Anderson, Ind.	18	East Orange, N. J.	71
Technical engineers.	Lewiston, Me.	4	Utica, N. Y.	18	Schenectady, N. Y.	128
Brick and stone masons.	Brooklinetown, Mass.	4	Schenectady, N. Y.	18	Irvington town, N. J.	42
Real estate agents.	Hazelton, Pa.	4	Green Bay, Wis.	15	Long Beach, Cal.	114
Physicians.	Clifton, N. J.	3	Lancaster, Pa.	15	Brooklinetown, Mass.	53
Guards.	Montclairtown, N. J.	5	Richmond, Va.	15	Auburn, N. Y.	40
Lawyers.	Bethlehem, Pa.	3	Norwalk, Conn.	14	Evanston, Ill.	74
Marshals, policemen.	Lincoln, Nebr.	5	Binghampton, N. Y.	14	Atlantic City, N. J.	37
Builders and contractors.	Columbus, Ga.	3	Bay City, Mich.	14	Long Beach, Cal.	53
Express messengers.	Gary, Ind.	4	Meriden, Conn.	13	Council Bluffs, Ia.	38
Bankers.	Chicopee, Mass.	3	Norwalk, Conn.	13	Montclairtown, N. J.	133

TABLE IV.—(Concluded)

Occupation	Lowest City		Median City		Highest City	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Bakers	Brookline town, Mass.	3	Pueblo, Colo.	13	Hoboken, N. J.	37
Tailors	Marion, O.	3	Bethlehem, Pa.	12	Cicero, Ill.	119
Shoemakers	East Cleveland, O.	4	Peoria, Ill.	12	Haverhill, Mass.	1545
Clergymen	Cicero, Ill.	4	Long Beach, Cal.	12	Waco, Tex.	40
Officials and inspectors (gov.)	Woonsocket, R. I.	3	Waterloo, Ia.	11	Newport, R. I.	91
Tinsmiths	Brookline town, Mass.	2	Stockton, Cal.	11	Racine, Wis.	54
Wholesale dealers	Lewiston, Me.	1	Tacoma, Wash.	10	Montclair town, N. J.	60
Semi-skilled operatives in lumber industries	East Chicago, Ind.	1	New Rochelle, N. Y.	10	Jamestown, N. Y.	382
Teachers	Cicero, Ill.	2	Gary, Ind.	10	Austin, Tex.	37
Restaurant keepers	Chicopee, Mass.	3	Portsmouth, O.	9	Sacramento, Cal.	24
Semi-skilled operatives in food industries	Brookline town, Mass.	1	Saginaw, Mich.	9	St. Joseph, Mo.	206
Laundresses	Clifton, N. J.	2	Rock Island, Ill.	9	Pasadena, Cal.	30
Musicians	Lorain, O.	2	Muskogee, Okla.	7	Atlantic City, N. J.	32
Foremen and overseers (R. R. Transportation)	Passaic, N. J.	1	Wichita Falls, Tex.	7	Altoona, Pa.	60
Dentists	Portsmouth, Va.	3	Williamsport, Pa.	7	Oak Park, Ill.	23
Stenographers	Chicopee, Mass.	1	Bloomington, Ill.	7	Topeka, Kans.	24
Garagekeepers	Cicero town, Ill.	1	Moline, Ill.	4	Stockton, Cal.	14
Authors	Chicopee, Mass.	1	Pittsfield, Mass.	4	Brookline town, Mass.	18
Jewelers	Chicopee, Mass.	1	Huntington, W. Va.	4	Irvington town, N. J.	89
Actors and showmen	East Chicago, Ind.	1	Dubuque, Ia.	4	Oklahoma City, Okla.	23
Photographers	Johnstown, Pa.	1	Fort Smith, Ark.	3	Miami, Fla.	11
Foremen and overseers (other transportation pursuits)	Wilmington, N. C.	1	East Orange, N. J.	3	Superior, Wis.	27
Undertakers	Clifton, N. J.	1	Columbia, S. C.	3	Troy, N. Y.	8

TABLE V.—THE "LESS CONSTANT" OCCUPATIONS FOR MEN IN 1900

Occupation	Lowest City		Median City		Highest City	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
	Iron workers	San Antonio, Tex.	9	Rochester, N. Y.	51	Reading, Pa.
Commercial travelers	Fall River, Mass.	4	Louisville, Ky.	29	Des Moines, Ia.	99
Tailors	Elizabeth, N. J.	9	Reading, Pa.	28	Rochester, N. Y.	165
Butchers	Portland, Me.	4	Eyansville, Ind.	26	St. Joseph, Mo.	116
Hucksters	Lynn, Mass.	8	Somerville, Mass.	22	Hartford, Conn.	50
Physicians	Hoboken, N. J.	8	Minneapolis, Minn.	22	Los Angeles, Cal.	50
Lawyers	Fall Rivers, Mass.	4	Utica, N. Y.	20	Seattle, Wash.	58
Laborers (agr.)	Wilkes-Barre, Pa.	6	Utica, N. Y.	19	Los Angeles, Cal.	69
Timplate workers	Fall River, Mass.	5	New York, N. Y.	18	Baltimore, Md.	50
Messengers	Manchester, N. H.	3	Utica, N. Y.	17	Washington, D. C.	48
Officials (bank)	Fall River, Mass.	7	Cincinnati, O.	16	Des Moines, Ia.	47
Tobacco workers	Charleston, S. C.	2	Buffalo, N. Y.	16	Louisville, Ky.	137
Electricians	Fall River, Mass.	5	Omaha, Nebr.	14	Lynn, Mass.	48
Clergymen	Hoboken, N. J.	6	Trenton, N. J.	13	Des Moines, Ia.	29
Janitors, sextons	New Orleans, La.	6	Fall River, Mass.	13	Cambridge, Mass.	29
Merchants, wholesale	Paterson, N. J.	3	Cambridge, Mass.	13	Kansas City, Mo.	41

TABLE V.—(Concluded)

Occupation	Lowest City		Median City		Highest City	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Hostlers.....	Elizabeth, N. J.....	2	St. Paul, Minn.....	13	Evansville, Ind.....	46
Officials (gov.).....	Troy, N. Y.....	6	Charleston, S. C.....	12	Washington, D. C.....	32
Musicians.....	Kansas City, Kans.....	5	St. Paul, Minn.....	11	Portland, Ore.....	25
Engineers (civil).....	Manchester, N. H.....	4	Richmond, Va.....	11	Seattle, Wash.....	45
Laundrymen.....	Scranton, Pa.....	3	Des Moines, Ia.....	11	Portland, Ore.....	92
Bankers, brokers.....	Trenton, N. J.....	3	Philadelphia, Pa.....	11	Los Angeles, Cal.....	51
Stonecutters.....	Elizabeth, N. J.....	3	Wilmington, Del.....	10	Cambridge, Mass.....	30
Teachers.....	Jersey City, N. J.....	6	Springfield, Mass.....	9	Cambridge, Mass.....	20
Upholsterers.....	Duluth, Minn.....	2	Peoria, Ill.....	9	Baltimore, Md.....	11
Confectioners.....	Manchester, N. H.....	2	Memphis, Tenn.....	7	St. Joseph, Mo.....	18
Gardeners, florists.....	Memphis, Tenn.....	2	Peoria, Ill.....	7	Portland, Ore.....	29
Journalists.....	Providence, R. I.....	3	Nashville, Tenn.....	6	Washington, D. C.....	14
Restaurant keepers.....	Milwaukee, Wis.....	2	Trenton, N. J.....	5	San Francisco, Cal.....	18
Dentists.....	Jersey City, N. J.....	2	St. Louis, Mo.....	5	Oakland, Cal.....	16
Photographers.....	Charleston, S. C.....	1	Manchester, N. H.....	5	Los Angeles, Cal.....	11

2. Occupations that showed a slight drop in the proportion of workers employed:

Physicians

3. Occupations that showed a considerable decrease in the proportion of workers employed:

Servants and waiters

Blacksmiths

Barbers

Printers

Brick and stone masons

Bakers

Tailors

Shoe makers

Laundry men

Stone cutters

Upholsterers

Hostlers

4. Occupations that showed an increase in the proportion of workers employed since 1900:

Janitors

Insurance agents

Real estate agents

Restaurant keepers

Stenographers

Actors and showmen

Undertakers

To this group should be added the occupation of "electrician" which increased to such an extent that it appeared as a "constant" occupation in 1920, while it was classified as a "less constant" occupation in 1900.

In the 1900 classification, "insurance agents" and "real estate agents" were grouped together as "agents." This group is not listed as either a "constant" or "less constant" occupation in 1900, while in 1920, both "real estate agents" and "insurance agents" appear as "less constant" occupations.

"Stenographers," "actors and showmen," and "undertakers" did not qualify as "less constant" occupations in 1900, even though they did appear in the classification of occupations used in the 1900 Census. In 1920, each of these occupations appeared in the "less constant" group.

5. The fifth and last group includes those occupations of Table V which have been created since 1900 as a result of changes in our social

TABLE VI.—THE RELATIVE VARIABILITY COEFFICIENTS OF THE
“LESS CONSTANT” OCCUPATIONS FOR MEN

Occupation	P ₁₀	P ₉₀	D (P ₉₀ - P ₁₀)	Median	D Median
Foremen and overseers (mfg.)	15	97	82	49	1.67
Semi-skilled operatives in other industries.....	15	165	150	38	3.94
Servants and waiters.....	16	89	73	37	1.97
Brakemen and conductors....	14	76	62	36	1.72
Chauffeurs.....	14	68	54	32	1.69
Mechanics.....	16	60	44	31	1.42
Firemen (not fire dept.).....	15	59	44	31	1.42
Stationary engineers.....	17	54	37	30	1.23
Clerks in stores.....	17	47	30	29	1.03
Commercial travelers.....	8	67	59	28	2.10
Blacksmiths.....	12	43	31	24	1.29
Barbers.....	15	32	17	24	.71
Printers.....	12	48	36	22	1.64
Agents, collectors.....	12	35	23	22	1.05
Janitors.....	13	31	18	22	.82
Insurance agents.....	11	37	26	18	1.44
Technical engineers.....	8	39	31	18	1.72
Brick and stone masons.....	9	30	21	18	1.16
Real estate agents.....	8	44	36	15	2.40
Physicians.....	10	24	14	15	.93
Guards.....	9	22	13	15	.87
Lawyers.....	6	32	26	14	1.85
Marshalls, policemen.....	10	20	10	14	.71
Builders and contractors.....	6	27	21	14	1.50
Express messengers.....	7	23	16	13	1.23
Bankers.....	6	41	35	13	2.69
Bakers.....	7	18	11	13	.84
Tailors.....	7	21	14	12	1.16
Shoemakers.....	8	48	40	12	3.33
Clergymen.....	7	21	14	12	1.16
Officials and inspectors (gov.)	7	21	14	11	1.27
Tinsmiths.....	6	20	14	11	1.27
Wholesale dealers.....	5	19	14	10	1.40
Semi-skilled operatives in lumber industries.....	3	45	42	10	4.20
Teachers.....	6	17	11	10	1.10
Restaurant keepers.....	5	15	10	9	1.11
Semi-skilled operatives in food industries.....	3	28	25	9	2.77
Launderers.....	5	16	11	9	1.22
Musicians.....	4	12	8	7	1.14
Foremen and overseers (R. R. Transportation).....	2	17	15	7	2.14
Dentists.....	5	12	7	7	1.00
Stenographers.....	3	12	9	7	1.28
Garage keepers.....	2	7	5	4	1.25
Authors.....	2	8	6	4	1.50
Jewelers.....	2	7	5	4	1.25
Actors and showmen.....	2	6	4	4	1.00
Photographers.....	2	6	4	3	1.33
Foremen and overseers (other transportation pursuits)...	1	6	5	3	1.67
Undertakers.....	2	5	3	3	1.00

and industrial life. These occupations are "chauffeurs" and "garage keepers."

Relative variability of the "less constant" occupations. As we pointed out in Chapter I, we must know something about the variability in employment among the different communities for each occupation. For this purpose, we adopted a variability coefficient which enables us to compare the relative variability in the rate of employment for the different occupations. The values of this coefficient for the "less constant" occupations are given in Table VI. As we glance down the last column in the table, we see that most of the values are somewhere near one. The highest values, and hence the greatest variabilities in the proportion employed, are found in "semi-skilled operatives in other industries," "semi-skilled operatives in the lumber industry," "shoe makers," and "semi-skilled operatives in the food industry." In all of these, we would expect a rather wide variation in the proportion employed in the different communities. The values of the coefficient of variability for the occupations of "barbers," "janitors," "physicians," "guards," "policemen," and "bakers" fall below one. This means that, relatively, the variation in the proportion of workers employed in these occupations is low.

CHAPTER IV

THE "VARIABLE" OCCUPATIONS FOR MEN

The "variable" occupations in 1920. By a "variable" occupation, we mean an occupation which does not offer employment to at least one worker per ten thousand population in all the communities that we are considering. For the purposes of the present study, we are interested in two aspects of the "variable" occupations for men: first, what these

TABLE VII.—THE RELATIVE VARIABILITY COEFFICIENTS OF THE "VARIABLE" OCCUPATIONS FOR MEN

Occupation	P ₁₀	P ₉₀	D (P ₉₀ - P ₁₀)	Median	D Median
Switchmen.....	3.53	36.66	33.13	14.49	2.29
Locomotive engineers.....	2.20	43.47	41.27	13.54	3.05
Motormen.....	4.73	17.85	13.12	10.89	1.21
Boilermakers.....	1.25	32.80	31.55	9.75	3.23
Firemen (fire dept.).....	4.35	14.12	9.77	9.71	1.01
Designers.....	2.62	20.83	18.21	8.95	2.04
Officials and superintendents (R. R. Transportation).....	1.66	13.38	11.72	7.10	1.65
Farmers.....	1.12	31.69	30.57	6.98	4.39
Inspectors (other transportation pursuits).....	1.66	15.79	14.13	6.59	2.14
Plasterers.....	1.26	11.64	10.38	6.24	1.68
Telegraph operators.....	2.28	10.39	8.11	5.78	1.40
Porters.....	1.01	30.22	29.21	5.24	5.57
Telephone linemen.....	2.26	8.96	6.70	5.07	1.32
Semi-skilled operatives in textiles.....	.43	168.75	168.32	4.14	40.46
Pattern and model makers.....	.66	11.72	11.06	4.14	2.67
Gardners.....	1.01	10.03	9.02	3.78	2.38
Hotel keepers.....	1.40	8.68	7.28	3.75	2.94
Extractors of minerals.....	.61	83.23	82.62	3.65	22.64
Chemists.....	1.12	10.52	9.40	3.35	2.38
Semi-skilled operatives in clothing industries.....	.66	14.56	13.90	3.28	4.23
Floorwalkers.....	1.11	5.68	4.57	3.09	1.47
Proprietors and managers of transfer companies.....	1.35	5.62	4.27	3.05	1.40
Semi-skilled operatives in tobacco industry.....	.34	16.86	16.52	2.99	5.42
Proprietors and officials (trade).....	1.00	8.80	7.80	2.88	2.70
Boiler washers.....	.26	8.89	8.63	2.72	3.17
Upholsterers.....	1.00	8.48	7.48	2.63	2.82
Baggagemen.....	.98	5.63	4.65	2.60	1.78
Semi-skilled operatives in clay, glass and stone industries.....	.63	12.48	11.85	2.35	5.04

occupations are; second, what the relative variabilities in employment are. Both of these facts are supplied in Table VII. The occupations are listed in the descending order of the proportion employed in the median city. The reports of the number of workers per ten thousand population are not given for the lowest and highest city, but only for the P_{10} , median, and P_{90} cities. The last column contains the relative "variability" coefficients. The occupations in which the proportion of workers per ten thousand population in the median city was zero are not given.

Our chief interest in the relative variabilities of the "variable" occupations is to make a comparison in all the occupations for men. As we look down the last column in Table VII, we notice at once that none

TABLE VII.—(Concluded)

Occupation	P_{10}	P_{90}	$\frac{D}{(P_{90} - P_{10})}$	Median	$\frac{D}{\text{Median}}$
Architects.....	.83	5.24	4.41	2.25	1.96
Paper hangers.....	.50	5.24	4.74	1.94	2.54
Proprietors and officials (other transportation pur- suits).....	.76	4.80	4.04	1.86	2.17
Semi-skilled operatives in chemistry.....	.31	9.16	8.85	1.82	4.86
Boarding-house keepers.....	.54	5.49	4.95	1.80	2.75
Structural iron workers.....	.36	5.73	5.37	1.77	3.03
Stone cutters.....	.69	3.84	3.15	1.72	1.83
Ticket and station agents.....	.55	2.77	2.22	1.62	1.37
Housekeepers.....	.56	3.46	2.90	1.61	1.86
Hostlers.....	.36	3.55	3.19	1.51	2.11
Artists.....	.30	4.81	4.51	1.43	3.19
Roofers and slaters.....	.28	3.35	3.07	1.34	2.29
Foremen of livery and trans- fer.....	.45	2.21	1.76	1.18	1.40
Decorators.....	.32	2.36	2.04	1.16	1.75
Semi-skilled operatives in harness industry.....	.30	4.56	4.26	1.11	3.83
Telephone operators.....	.41	2.34	1.93	1.11	1.73
Coopers.....	.00	5.26	5.26	1.05	5.00
College professors.....	.00	5.80	5.80	1.01	5.74
Engravers.....	.27	3.78	3.51	.97	3.61
Veterinary surgeons.....	.29	2.01	1.72	.91	1.88
Inspectors (trade).....	.00	3.51	3.51	.75	4.68
Millers.....	.00	3.64	3.64	.73	4.98
Express company agents.....	.00	1.23	1.23	.52	2.36
Captains.....	.00	9.93	9.93	.50	19.86
Osteopaths.....	.00	1.15	1.15	.41	2.80
Trained nurses.....	.00	1.31	1.31	.36	3.63
Milliners.....	.10	1.10	1.00	.36	2.77
Semi-skilled operatives in paper industry.....	.00	8.90	8.90	.33	26.97
Boatmen.....	.00	1.71	1.71	.17	10.06
Semi-skilled operatives in tanneries.....	.00	4.86	4.86	.15	32.40

of the coefficients are below one, and one-half of them are over two. Such occupations as "extractors of minerals," "boatmen," and "captains" show a very high relative variability, while such occupations as "plasterers," "telegraph operators," "motormen," and "telegraph and telephone linemen" have a coefficient falling between one and two. A knowledge of these coefficients of variability enables us to interpret more accurately the coefficients that we obtained for the "constant" and "less constant" occupations. An occupation that has a coefficient of variation of one or less does not vary greatly, when compared with other occupations, in the rate of employment from community to community. When we considered the "constant" occupations in Chapter II, we learned that all but two of them had coefficients of one or less. Thus, all but two of them are "constant," not only in the sense in which we are using the term in this study (i.e., employing ten or more workers per ten thousand inhabitants in all the communities studied), but also in the sense that the proportion of workers per ten thousand population does not vary greatly from one community to another.

CHAPTER V

THE "CONSTANT" OCCUPATIONS FOR WOMEN

The "constant" occupations in 1920. The occupations that offer employment to at least ten women per ten thousand inhabitants in the 218 cities of the United States having a population between twenty-five thousand and one hundred thousand in 1920 are given in Table VIII. The procedure of listing the occupations in the descending order of the proportion in the median city is followed. Inspection of Table VIII shows that there were six "constant" occupations for women in 1920.

Comparison with Ayres' "constant" occupations of 1900. Ayres' "constant" occupations for women are given in Table IX. When making the comparison, we must bear in mind the two limitations that we pointed out in Chapter II. The first limitation arises out of the changes in the occupational classification which the Census Bureau made in 1910. In this change, the composition of some of the occupational groups was altered to such an extent that comparison is not possible. The second limitation is that Ayres studied cities having a population of fifty thousand and over, while the present study was made of cities having twenty-five thousand to one hundred thousand population.

A detailed study of Tables VIII and IX gives the following results:

1. There seems to have been a decrease in the proportion of women employed as "servants and waiters," but there has also been some concentration in certain cities.

2. There has been no significant change in the proportion of women employed as "saleswomen."

3. The occupations of "dressmakers," "teachers," "laundresses," "nurses," and "housekeepers" appeared as "constant" occupations in 1900, but not in 1920. Of these the occupations of "teachers" and "nurses" differed in composition in 1920 from that of 1900 to such an extent that comparison is not possible. The other three, "dressmakers," "laundresses," and "housekeepers," decreased in the proportion employed to such an extent that they appear as "less constant" in the present study, as we shall see in the next chapter.

4. The occupations of "stenographers" and "accountants" increased in the proportion employed to such an extent that they rose from "less constant" in 1900 to "constant" in 1920.

Reasons for the differences. It is impossible to do more here than

TABLE VIII.—THE "CONSTANT" OCCUPATIONS FOR WOMEN IN 1920

Occupation	Lowest City		Median City		Highest City	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Servants and waiters	West New York town, N. J.	22	Auburn, N. Y.	117	Brooklinton, Mass.	964
Stenographers	Lewiston, Me.	29	Montgomery, Ala.	82	Madison, Wis.	174
Teachers	Cicero, Ill.	16	Somerville, Mass.	60	Berkeley, Cal.	153
Saleswomen	Chicopee, Mass.	10	Cumberland, Md.	57	Fresno, Cal.	108
Accountants	East Chicago, Ind.	18	Lawrence, Mass.	56	Malden, Mass.	132
Clerks (except in stores)	Kingston, N. Y.	15	Sioux City, Ia.	52	Kerneytown, N. J.	201

TABLE IX.—THE "CONSTANT" OCCUPATIONS FOR WOMEN IN 1900

Occupation	Lowest City		Median City		Highest City	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Servants	Fall River, Mass.	98	Detroit, Mich.	244	Memphis, Tenn.	519
Dressmakers	Kansas City, Kans.	40	Portland, Me.	87	Charleston, S. C.	175
Teachers	Kansas City, Kans.	19	Lynn, Mass.	47	Des Moines, Ia.	83
Saleswomen	Manchester, N. H.	29	Harrisburg, Pa.	43	Boston, Mass.	92
Laundresses	Lawrence, Mass.	27	Chicago, Ill.	39	Savannah, Ga.	588
Nurses	Fall River, Mass.	13	Somerville, Mass.	26	Atlanta, Ga.	85
Housekeepers	San Antonio, Tex.	10	Bridgeport, Conn.	21	Lowell, Mass.	46

merely point out some of the more significant factors that account in part for the changes in the "constant" occupations that we have just noted. The effect of the use of machinery is clearly shown in the significant changes in the proportion employed as "dressmakers" and "laundresses." The proportion of "dressmakers" in 1920 in over one-half of the cities was below the proportion in the lowest city in 1900. "Laundresses" shows a smaller decrease.

The tendency of women to enter gainful occupations is also shown in the changes in the "constant" occupations. The occupation of "stenographers" which appeared in the "less constant" group stood second in the list of "constant" occupations in 1920. Although the occupation of "teachers" included "teachers and professors in college" in 1900 and only "teachers" in 1920, it nevertheless showed an increase in the median and highest city in 1920.

Relative variability of the "constant" occupations for women. The coefficients of variability for the "constant" occupations are given in Table X. The coefficients for all the occupations are near one, except

TABLE X.—THE RELATIVE VARIABILITY COEFFICIENTS OF THE "CONSTANT" OCCUPATIONS FOR WOMEN IN 1920

Occupation	P ₁₀	P ₉₀	D (P ₉₀ - P ₁₀)	Median	$\frac{D}{\text{Median}}$
Servants and waiters.....	65	325	260	117	2.22
Stenographers.....	53	128	75	82	.91
Teachers.....	45	88	43	60	.72
Saleswomen.....	32	83	51	57	.90
Accountants.....	34	81	47	56	.84
Clerks (except clerks in stores)	26	99	73	52	1.40

that of "servants and waiters." This means that, relatively, the occupations of this group, with the exception of "servants and waiters," do not vary greatly in the proportion employed from one community to another.

CHAPTER VI

THE "LESS CONSTANT" AND "VARIABLE" OCCUPATIONS FOR WOMEN

The "less constant" occupations in 1920. Those occupations which offer employment to at least one worker per ten thousand population in all the communities studied but which do not qualify as "constant" occupations are designated throughout this study as "less constant" occupations. The "less constant" occupations for women in 1920 are given in Table XI, arranged in the descending order of the proportion of workers employed in the median city. The table shows that there were twelve "less constant" occupations for women.

Comparison with Ayres' "less constant" occupations. For the convenience of the reader, Ayres' list of "less constant" occupations is reproduced in Table XII. In the occupational classification made by the Census Bureau in 1910, the composition of the groups "seamstresses," "clerks," "trained nurses," "semi-skilled operatives in the clothing industry," and "semi-skilled operatives in other industries" was changed to such an extent that comparison is impossible. A study of the data for the remaining occupations appearing in Tables XI and XII, discloses the following facts:

1. The occupations of "stenographers" and "bookkeepers" appeared as "less constant" in 1900. As we learned in the last chapter, they appeared as "constant" occupations in 1920.

2. The occupations of "laundresses," "dressmakers," and "housekeepers" dropped from the "constant" group to the "less constant" in the period 1900 to 1920.

3. "Telephone operators" appeared in the "less constant" groups in both Ayres' and the present study, but showed a considerable increase in the proportion employed in 1920 over that of 1900.

4. "Milliners" appeared in the "less constant" group in both the 1900 and the present study, but showed a decrease in 1920 as compared with 1900.

5. There was no significant change in "boarding-house keepers," "musicians," and "retail dealers."

6. It is interesting to note that the occupation of "barbers" failed to qualify as "less constant" by only one city, West Hoboken Town, New Jersey, which was reported as having only twenty-five hundredths

TABLE XI.—THE "LESS CONSTANT" OCCUPATIONS FOR WOMEN IN 1920

Occupation	Lowest City		Median City		Highest City	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Laundresses.....	Chicopee, Mass.....	3	Sacramento, Cal.....	32	Montgomery, Ala.....	554
Dressmakers.....	Lorain, O.....	6	Everett, Wash.....	30	Hoboken, N. J.....	125
Housekeepers.....	West Hoboken town, N. J.....	7	New London, Conn.....	24	Pasadena, Cal.....	62
Clerks in stores.....	Decatur, Ill.....	4	Pueblo, Colo.....	23	McKeesport, Pa.....	70
Trained nurses.....	East Chicago, Ind.....	2	Waterloo, Ia.....	22	Battle Creek, Mich.....	87
Telephone operators.....	Tampa, Fla.....	3	Hamilton, O.....	20	Oklahoma City, Okla.....	57
Semi-skilled operatives in clothing industries.....	Chester, Pa.....	1	San Jose, Cal.....	17	Troy, N. Y.....	803
Boarding-house keepers.....	West New York town, N. J.....	1	Watertown, N. Y.....	17	Galveston, Tex.....	69
Semi-skilled operatives in other industries.....	Newport News, Va.....	1	Hagerstown, Md.....	16	Malden, Mass.....	210
Musicians.....	East Chicago, Ind.....	1	Everett, Mass.....	10	Berkeley, Cal.....	36
Retail dealers.....	Flint, Mich.....	3	Quincy, Ill.....	10	Savannah, Ga.....	30
Milliners.....	East Chicago, Ind.....	1	Chatanooga, Tenn.....	8	Quincy, Ill.....	19

TABLE XII.—THE "LESS CONSTANT" OCCUPATIONS FOR WOMEN IN 1900

Occupation	Lowest City		Median City		Highest City	
	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.	City	Workers per 10,000 pop.
Stenographers.....	Fall River, Mass.....	5	Louisville, Ky.....	63	Omaha, Nebr.....	73
Seamstresses.....	Fall River, Mass.....	4	Detroit, Mich.....	32	St. Joseph, Mo.....	200
Clerks.....	San Antonio, Tex.....	7	Hoboken, N. J.....	24	Washington, D. C.....	168
Bookkeepers.....	San Antonio, Tex.....	4	Newark, N. J.....	22	Boston, Mass.....	64
Milliners.....	San Antonio, Tex.....	8	Columbus, O.....	19	St. Joseph, Mo.....	38
Boarding-house keepers.....	Jersey City, N. J.....	5	Salt Lake City, U.....	15	Savannah, Ga.....	39
Musicians.....	Paterson, N. J.....	4	Harrisburg, Pa.....	11	Los Angeles, Cal.....	28
Merchants, retail.....	St. Joseph, Mo.....	3	Milwaukee, Wis.....	9	Wilmington, Del.....	24
Laborers.....	Somerville, Mass.....	2	Cambridge, Mass.....	6	Kansas City, Kan.....	36
Telephone operators.....	Fall River, Mass.....	2	Cincinnati, O.....	5	Grand Rapids, Mich.....	16

“barbers” per ten thousand inhabitants. The proportion for the median city was 4.26 and for the highest city, 33.75.

Relative variability of the “less constant” occupations. The relative variability coefficients for the “less constant” occupations for women are given in the last column of Table XIII. All of the occupations but

TABLE XIII.—THE RELATIVE VARIABILITY COEFFICIENTS OF THE “LESS CONSTANT” OCCUPATIONS FOR WOMEN

Occupation	P ₁₀	P ₉₀	$\frac{D}{(P_{90} - P_{10})}$	Median	$\frac{D}{\text{Median}}$
Laundresses.....	12	214	202	32	6.31
Dressmakers.....	15	48	33	30	1.10
Housekeepers.....	13	39	26	24	1.08
Clerks in stores.....	11	40	29	23	1.26
Trained nurses.....	8	39	31	22	1.41
Telephone operators.....	12	31	19	20	.95
Semi-skilled operatives in clothing industries.....	5	69	64	17	3.76
Boarding-house keepers.....	5	31	26	17	1.53
Semi-skilled operatives in other industries.....	3	93	90	16	5.62
Musicians.....	6	16	10	10	1.00
Retail dealers.....	6	16	10	10	1.00
Milliners.....	4	12	8	8	1.00

three show coefficients whose values are somewhere near one. The three occupations which have coefficients considerably greater in value than one are, “laundresses,” “semi-skilled operatives in the clothing industry,” and “semi-skilled operatives in other industries.”

Relative variability of the “variable” occupations for women. The coefficients of variability for the “variable” occupations for women are given in Table XIV. Those occupations in which the proportion employed in the median city was zero were omitted. The values for P₁₀, P₉₀, and median are given to two decimal places, the way in which they appear in the original calculations. If the decimals were dropped, the changes in the ratios would be considerable, especially in the occupations near the bottom of the table. The decimals were therefore retained.

As we glance down the last column, we see that such occupations as “semi-skilled operatives in textiles,” “semi-skilled operatives in the lumber industry,” “semi-skilled operatives in the tobacco industry,” and “shoe makers” show considerable variation from community to community. Such occupations as “metal workers,” “semi-skilled operatives in the food industry,” “college professors,” “semi-skilled operatives in

the chemical industry," "real estate agents," and "dairy farmers" show a lower variation. "Agents and collectors" show the smallest variation of this group. It is interesting to note the relative variation in the occu-

TABLE XIV.—THE VARIABILITY COEFFICIENTS FOR THE
"VARIABLE" OCCUPATIONS FOR WOMEN IN 1920

Occupation	P ₁₀	P ₉₀	D (P ₉₀ - P ₁₀)	Median	$\frac{D}{\text{Median}}$
Semi-skilled operatives in textiles.....	.43	232.99	232.56	8.17	28.41
Metal workers.....	.69	50.12	49.53	6.51	7.59
Foremen and overseers (mfg.).....	.44	11.06	10.62	4.48	2.37
Barbers.....	1.53	9.75	8.22	4.26	1.93
Semi-skilled operatives in food industries.....	.51	23.18	22.67	4.22	5.37
Printers.....	1.24	13.99	12.75	4.11	3.10
Janitors.....	.74	5.62	4.88	2.38	2.05
Agents, collectors.....	.78	4.11	3.33	2.21	1.50
Restaurant keepers.....	.67	4.57	3.90	2.10	1.86
Tailors.....	.60	4.97	4.37	2.02	2.16
Managers and superintendents (mfg.).....	.59	3.65	3.06	1.68	1.82
Artists.....	.33	3.65	3.32	1.24	2.76
Semi-skilled operatives in tobacco industry.....	.00	41.47	41.47	1.18	35.14
Telegraph operators.....	.34	4.14	3.80	1.17	2.39
Photographers.....	.28	2.34	2.06	1.01	2.04
Authors.....	.28	2.21	1.93	.96	2.01
Physicians.....	.23	2.27	2.04	.81	2.52
Semi-skilled operatives in lumber industry.....	.00	7.47	7.47	.77	9.70
College professors.....	.00	3.57	3.57	.70	5.10
Actors.....	.00	2.35	2.35	.70	3.36
Semi-skilled operatives in chemical industries.....	.00	4.39	4.39	.69	6.36
Insurance agents.....	.00	1.82	1.82	.68	2.69
Hotel keepers.....	.00	2.89	2.89	.67	4.31
Bakers.....	.00	1.94	1.94	.67	2.89
Real estate agents.....	.00	3.15	3.15	.65	4.85
Officials and inspectors (gov.).....	.13	1.65	1.52	.57	2.66
Painters.....	.00	2.07	2.07	.55	3.76
Designers.....	.00	1.63	1.63	.52	3.13
Commercial travelers.....	.00	1.08	1.08	.37	2.92
Floor walkers.....	.00	1.19	1.19	.36	3.30
Bankers.....	.00	1.21	1.21	.30	4.03
Farmers.....	.00	1.29	1.29	.23	5.61
Proprietors, officials, etc. (trade).....	.00	.68	.68	.22	3.04
Semi-skilled operatives in shoe industries.....	.00	25.04	25.04	.21	119.23
Osteopaths.....	.00	.77	.77	.21	3.66
Dentists.....	.00	.72	.72	.20	3.60
Policemen.....	.00	.48	.48	.20	2.40
Lawyers.....	.00	.56	.56	.18	3.11
Chemists.....	.00	.72	.72	.16	4.50
Gardeners and florists.....	.00	.75	.75	.15	5.00
Clergymen.....	.00	.67	.67	.11	6.09

pation of "physicians" for women as compared with that for men. For men, the coefficient was near one, while for women it was considerably above two.

CHAPTER VII

SUMMARY AND SIGNIFICANCE OF THE DATA

Summary. The foregoing pages contain the results of a study of the proportion of workers employed in 1920 in the various occupations in the cities of the United States having from twenty-five thousand to one hundred thousand population, and a comparison of these results with those obtained by Ayres in a similar study of the 1900 Census. The purpose of the study is to furnish some of the facts that are necessary for an intelligent selection and application of the principles underlying the choice of occupations that should be represented by the corresponding vocational subjects in the secondary-school curriculum. The data for the study were taken from the United States Census Reports of 1920. The opportunities for employment were measured by the number of workers per ten thousand population. Occupations were divided into three classes with respect to the number of workers per ten thousand inhabitants. Those occupations which employed ten or more workers per ten thousand population in all the 218 cities studied are designated as "constant" occupations. Those occupations which employed one or more workers per ten thousand population but which did not qualify as "constant" are designated "less constant." The occupations which did not qualify as "constant" or "less constant" are designated as "variable."

For each of the occupations, a measure was secured by which it is possible to compare the variability in the proportion employed from community to community in one occupation with the variation in another. This measure is designated as the coefficient of variability.

The following results were obtained:

1. The "constant" occupations for men in 1920 were "retail dealers," "machinists," "clerks (except clerks in stores)," "metal workers," "carpenters and cabinet makers," "salesmen," "draymen," "painters," "managers and superintendents (manufacturing)," "bookkeepers and accountants," "plumbers," and "electricians."

2. Of the "constant" occupations for men, the group "electricians" was added since 1900.

3. The values of the variability coefficient for all the "constant" occupations are small except for "metal workers" and "machinists."

This means that all but these two do not vary greatly, relatively, in the rate of employment in all the 218 cities studied.

4. The occupations for men of "waiters," "printers," "blacksmiths," "masons," "barbers," "shoe makers," and "bakers" which appeared as "constant" occupations in 1900 had decreased in the proportion of workers per total population to such an extent that they were classified as "less constant" occupations in 1920.

5. There were forty-nine occupations for men that could be classified as "less constant" in 1920.

6. Among the list of "less constant" occupations for men, there appeared two occupations which had been developed since 1900. They are "chauffeurs" and "garage keepers."

7. For women, the "constant" occupations were:

- Servants and waiters
- Stenographers
- Teachers
- Saleswomen
- Accountants
- Clerks (except clerks in stores)

Of this group, "stenographers" and "accountants" were added since 1900.

8. The occupations of "dressmakers," "laundresses," and "house-keepers" dropped from the "constant" group to the "less constant" group since 1900.

9. All of the "constant" occupations for women except "servants and waiters" show a relatively low variability in the proportion employed from one community to another.

10. There were twelve "less constant" occupations for women in 1920.

Significance of the data. This study is essentially a fact-finding study. There are, however, a few statements that we make by way of interpretation. In our thinking out the problem of the selection and application of the principles underlying the choice of occupations to be represented in the secondary-school curriculum, there are certain data that we must have at hand. Among other things, we should know the situation with reference to the rate and demand for workers in the various occupations wherever large numbers of people live together. This study has attempted to supply this information for cities having twenty-five thousand to one hundred thousand population. We have seen that all occupations tend to vary from one community to another in the ratio of workers employed per total population. This is not surprising. There

are many factors that determine the number employed in any one community and "total population" is only one of these. It is also possible that many cities have not reached the "saturation point" of employment in some of the occupations.

In spite of this variation in the ratio of workers to total population it appears that we can pick out certain occupations which employ a high proportion of workers per total population, and which do not vary greatly, relatively, from one community to another in the proportion employed. The occupations of "retail dealers," "clerks," "carpenters," "painters," "plumbers," and "electricians" for men, and "stenographers," "saleswomen," "teachers," and "accountants" for women are illustrations. These facts do not constitute a complete guide for the selection of vocational courses. They do, however, tell us considerable about a characteristic of occupations that is important in solving the problems of vocational education.

Since it has been possible to make a comparison at certain points with Ayres' study of the 1900 Census, there is another significant conclusion that we should note. We shall illustrate this by using a specific example. In Chapters II and III, we learned that a large decrease in the proportion of men employed per ten thousand population as "printers" has taken place in the last twenty years. This is true even if we allow for the slight differences in the composition of the occupation in the Census classification of 1900 and 1920, and for the difference in the size of the community considered in the two studies. We can obtain another measure of this decrease by considering the total number of workers employed as "printers" in the United States in 1900 and in 1920. When we do this, we find that the increase in the total number of workers is less than 50 per cent of the 1900 number—a figure that is much less than the increase in the total output of printing. Thus, there have been some significant changes that have taken place in the occupation of printing during the last twenty years.

Our data show that there have been similar significant changes in several other occupations. This fact has two important consequences. In the first place, surveys of the type reported in this bulletin must be made frequently. This fact has been sufficiently recognized in educational writings and we need not emphasize it here. The second consequence is more important. Changes necessitate adjustments. It is an important part of the job of the workers in an occupation to make these adjustments. Adjustments must be made to newly-invented or perfected machines, to new or different methods of work, or to the development of new products which may supplement or completely replace

the older products. Furthermore, as Kilpatrick⁴ has pointed out, since the body of tested thought becomes larger, changes tend to become more rapid. For education, this means that training for specific occupations cannot afford to neglect training in ability to make adjustments. This aspect of training for vocations has not been sufficiently emphasized in the programs of the past. It must be emphasized in the programs of the future.

⁴KILPATRICK, W. H. *Educating for a Changing Civilization*. New York: The Macmillan Company, 1926. 143 p.

APPENDIX

The following list of occupations shows the groupings and omissions that were made in this study.

I. Agriculture, forestry, and animal husbandry

1. Farmers
 - a. Farmers, dairy farmers, and stock raisers
 - b. Dairy farm, farm, and garden foremen
2. Gardeners, florists, fruit growers, and nurserymen

II. Extraction of minerals

3. Extractors of minerals (total of the whole group)

III. Manufacturing and mechanical industries

4. Bakers
5. Blacksmiths, forgemen, and hammermen
6. Boiler makers
7. Brick and stone masons
8. Builders and building contractors
9. Carpenters, cabinetmakers, and sawyers
10. Printers
 - a. Compositors, linotypists, and typesetters
 - b. Electrotypers, stereotypers, and lithographers
 - c. Pressmen and plate printers
 - d. Semi-skilled operatives in printing and publishing
11. Coopers
12. Dressmakers and seamstresses (not in factory)
13. Dyers
14. Electricians
15. Engineers (stationary), cranemen, etc.
16. Engravers
17. Machinists
 - a. Filers and grinders
 - b. Machinists, millwrights, etc.
18. Firemen
 - a. Firemen (except locomotive and fire department)
 - b. Locomotive firemen
19. Foremen and overseers (manufacturing)
20. Metal workers
 - a. Furnacemen, smeltermen, heaters, and pourers
 - b. Moulders, founders, and casters
 - c. Rollers and roller hands
 - d. Semi-skilled operatives in iron and steel
 - e. Semi-skilled operatives in other metals
21. Glass blowers
22. Jewelers, watchmakers, etc.
23. Loom fixers
24. Managers and superintendents (manufacturing)
 - a. Managers and superintendents (manufacturing)
 - b. Manufacturers and officials
25. Mechanics

26. Millers
27. Milliners and millinery dealers
28. Painters, glaziers, etc.
29. Paper hangers
30. Pattern and model makers
31. Plasterers and cement finishers
32. Plumbers and gas and steam fitters
33. Roofers and slaters
34. Semi-skilled operatives in chemical and allied industries
35. Semi-skilled operatives in cigar and tobacco industries
36. Semi-skilled operatives in clay, glass, and stone industries
37. Semi-skilled operatives in clothing industries
38. Semi-skilled operatives in food industries
39. Semi-skilled operatives in harness and saddle industries
40. Semi-skilled operatives in lumber and furniture industries
41. Semi-skilled operatives in paper and pulp industries
42. Shoemakers
 - a. Semi-skilled operatives in shoe factories
 - b. Shoemakers and cobblers (not in factory)
43. Semi-skilled operatives in tanneries
44. Semi-skilled operatives in textile industries
45. Semi-skilled operatives in other industries
46. Stonecutters
47. Structural iron workers
48. Tailors
49. Tinsmiths and coppersmiths
50. Upholsterers

IV. Transportation

- A. Water transportation
 51. Boatmen, canalmen, etc.
 52. Captains, masters, mates, etc.
- B. Road and street transportation
 53. Chauffeurs
 54. Draymen
 55. Foremen of livery and transfer companies
 - a. Foremen of livery and transfer companies
 - b. Livery stable keepers and managers
 56. Garage keepers
 57. Hostlers
 58. Proprietors and managers of transfer companies
- C. Railroad transportation
 59. Baggage men and freight agents
 60. Boiler washers
 61. Brakemen and conductors
 - a. Brakemen
 - b. Conductors (steam railway)
 - c. Conductors (street railway)
 62. Foremen and overseers
 63. Locomotive engineers
 64. Motormen
 65. Officials and superintendents
 66. Switchmen, flagmen, and yardmen
 67. Ticket and station agents
- D. Express, post, telegraph, and telephone

68. Agents (express company)
69. Express messengers
 - a. Express messengers and railway mail clerks
 - b. Mail carriers
 - c. Telegraph messengers
70. Telegraph and telephone linemen
71. Telegraph operators
72. Telephone operators
- E. Other transportation pursuits
 73. Foremen and overseers
 74. Inspectors
 75. Proprietors, officials, and managers

V. Trade

76. Bankers and brokers
77. Clerks in stores
78. Commercial travelers
79. Decorators, drapers, etc.
80. Floorwalkers
81. Inspectors, gaugers, and samplers
82. Insurance agents and officials
83. Proprietors, officials, and managers (N.O.S.)
84. Real estate agents
85. Retail dealers
86. Salesmen and saleswomen
87. Undertakers
88. Wholesale dealers

VI. Public Service

89. Firemen (fire department)
90. Guards
91. Marshals and policemen
 - a. Marshals, sheriffs, and detectives
 - b. Policemen
92. Officials and inspectors (government)
 - a. Officials and inspectors (city and county)
 - b. Officials and inspectors (United States)

VII. Professional Service

93. Actors and showmen
94. Architects
95. Artists and sculptors
96. Authors, editors, and reporters
97. Chemists
98. Clergymen
99. College presidents and professors
100. Dentists
101. Designers and draftsmen
102. Lawyers
103. Musicians and teachers of music
104. Osteopaths
105. Photographers
106. Physicians and surgeons
107. Teachers
108. Technical engineers
109. Trained nurses

- 110. Veterinary surgeons
- 111. Barbers
- 112. Boarding and lodging-house keepers
- 113. Hotel keepers and managers
- 114. Housekeepers and stewards
- 115. Janitors and sextons
- 116. Laundrymen
 - a. Laundry operatives (not in laundry)
 - b. Laundry operatives
 - c. Laundry owners and officials
- 117. Porters
- 118. Restaurant keepers
- 119. Servants and waiters

VIII. Clerical occupations

- 120. Agents and canvassers
- 121. Bookkeepers, cashiers, and accountants
- 122. Clerks (except clerks in stores)
- 123. Stenographers and typists

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