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mains the possibility of an analysis for the two professions combined. We have previously indicated that in large part accountants and lawyers serve the same clientele. This suggests that the ratio of lawyers to accountants might be comparable from state to state and might be correlated with the income ratio in the two professions. For both 1934 and 1936 the correlation is negative, but so small that the data are best described as showing zero correlation.[24] Several factors may be assumed to contribute to this low correlation. Accountants and lawyers serve essentially the same business clientele, but accountants serve business enterprises almost exclusively, whereas lawyers render services to ultimate consumers as well. The market for legal services partakes of the characteristics of the market for medical and dental services as well as of that for accounting services. In addition to this theoretical difficulty, the data used are defective. The chief defect is that the available figures on number of practitioners include both salaried employees and independent practitioners while our income data are for the latter alone.

CHAPTER 5

Income and the Location of Practice

A WISE CHOICE of a profession may improve an individual's chance of earning a good livelihood; it cannot guarantee him success. The attempts of numerous individuals to choose wisely limit the opportunities for profiting by a wise choice and tend to equalize, not incomes, but the "whole of the advantages and disadvantages" of different professions. In addition, as we have

[24] The rank difference correlation is —.078 for 1934, and —.076 for 1936.

seen, the incomes of men who practise the same profession differ widely. Some attain a professional status that enables them to sell at attractive prices all the services they care to render; others find it difficult to sell their services even at low prices.

The factors that determine a professional man's income are numerous and varied. Some, like profession, give rise to differences that the forces of competition continually tend to obliterate. Others, either by their very nature or for institutional reasons, give rise to differences competition alone cannot touch. Few are susceptible of quantitative or objective evaluation. How can we measure 'personality', the influence of family and personal connections, and the like? Finally, there are the many factors of which we are ignorant; these we usually combine with the ever-present element of 'pure luck', under the convenient heading of 'chance'.

In this and the next chapter, we consider a few of the many factors that account for differences among incomes received by men in the same profession. In this chapter we consider the effect of the location of practice, so far as this effect is revealed by a classification of communities by geographic location and size. In the next chapter, we consider a variety of factors, some having to do with the 'quality' of the practitioner—training and ability, and number of years in practice; the rest, with the type of practice he engages in and the way that practice is organized—general *vs.* specialized practice, practice as an individual *vs.* practice as a firm member, independent *vs.* salaried practice.

Though almost all of the factors analyzed in this and the next chapter definitely play a part in determining the income a man receives, even taken all together they account for only a small part of the total variability of income among men in the same profession. Individuals alike with respect to all still receive incomes that differ widely. To some extent, the variability we are unable to account for reflects the effect of factors that limitations of our data make it impossible for us to study. To a not

inconsiderable extent, however, it also reflects the influence of chance occurrences that make a man's income relatively high this year and relatively low next year. Some light is thrown on the importance of such chance occurrences by Chapter 7, in which we investigate the fluctuations from year to year in the relative positions men occupy in an array of practitioners by size of income.

Experimental computations contained in the Appendix to Chapter 7 (Sec. 2a ii) illustrate the possible importance of the groups of factors just discussed. Of the total variability of physicians' incomes in 1933, some 22 per cent can be attributed to size of community, number of years in practice, and type of practice—factors studied in this and the next chapter. Another 13 per cent can be attributed to factors present in 1933 but not in both 1932 and 1934—to factors that can perhaps be identified with 'chance occurrences'. The remaining 65 per cent of the variability is accounted for either by factors that we have been unable to study or by chance occurrences whose effects were present over the whole of a three-year period. This 65 per cent that remains is both a measure of our failure and a challenge to future investigators.

Changes in the relative economic advantages of different professions are reflected primarily in the number of young people who each year start to train for them. Changes in the relative advantages of different localities, on the other hand, are reflected in the geographic distribution of both young people just beginning practice or training and persons already in active practice. However, the difference between professional and geographical mobility is probably not great. The uncertainties attached to beginning anew elsewhere, the capital needed to cover living expenses during the period of adjustment, and the direct costs of moving combine with inertia and habit to keep professional men from moving to new and possibly more advantageous locations. These obstacles are especially serious for men in independent practice because of the

capital value represented by an established practice, and the inevitably low level of earnings during the initial period in a new location. The individuals who have fared poorly in their present location have the greatest incentive to move; but they are least likely to have the necessary capital. Those who have done well will probably have less difficulty in procuring capital, but they have less to gain and more to lose by moving. Consequently, new entrants probably play almost as large a role in adjustments among localities as in adjustments among professions.[1]

The place where a man practises, like the profession of which he becomes a member, is determined by a wide variety of considerations, differing from person to person. Most individuals like to live near their families and friends in surroundings to which they are habituated. For some, this desire is reinforced by professional advantages from family and personal connections, greater possibility of getting income from nonprofessional activities, and ignorance of opportunities elsewhere. For others, it may be offset by greater earning possibilities in other communities and a desire for change. Whenever the relative pecuniary attractiveness of alternative locations affects the

[1] New admissions to the bar averaged approximately 7,500 annually for the decade of the 'twenties and 9,000 for 1932–39, while the number of lawyers admitted to the bar who had previously been admitted in other states averaged 900 and 600 respectively. Some of them may not have changed the location of their practice but merely made arrangements to practise in more than one state at the same time. New admissions to medical practice averaged less than 6,000 for 1933–38, while new licenses issued averaged about 8,500. The difference between these two figures overstates the number of physicians shifting from one state to another, since some new entrants simultaneously take out licenses in more than one state. The total number of lawyers in independent practice was about 110,000 in 1930, the total number of physicians, about 120,000. See Tables 1–3; 'Admissions to the Bar by States, 1920 to 1930', *Bar Examiner*, Aug. 1932, p. 273; 'Medical Licensure Statistics for 1936'; 'Medical Licensure Statistics for 1938'.

It is clear from these figures that the number who actually change location is small relatively to both new entrants and all practitioners. However, they describe actual rather than potential mobility. The greater movement in law during the 'twenties than later suggests but of course does not establish that mobility is greater in good times than in bad.

decision, it will be balanced against other advantages or disadvantages. Differences in cost of living, climate, physical and cultural characteristics, and the professional facilities available may all play a part. In short, individuals compare the "whole of the advantages and disadvantages" of alternative locations.

Even if all professional men were in a position to settle where they would, or to move from one place to another, and even if many took economic considerations into account in deciding where to practise, incomes in different communities, like incomes in different professions, would not necessarily be equal. Rather they would tend to be 'equivalent': income differences would reflect and compensate for generally recognized differences in nonpecuniary advantages. As already pointed out, not all professional men are in a position to settle where they will, or move from one place to another. The actual degree of mobility may or may not be sufficient to bring about a close adjustment among incomes in different localities; if it is not, differences in income attributable to immobility will be superimposed on 'equalizing' differences.

A direct approach to measuring how much of the existing differences in income is attributable to differences in nonpecuniary advantages and how much to immobility offers little promise. Most of the considerations governing the choice of a place to live are not subject to even rough quantitative evaluation. One important factor that may compensate for differences in pecuniary returns—differences among communities in cost of living—is susceptible to measurement but has not yet been gauged with sufficient accuracy to justify intensive analysis.

An indirect approach to the problem that seems somewhat more promising is to compare differences in professional income with differences in the income of other persons. Most of the nonpecuniary advantages or disadvantages of a particular locality are evaluated similarly by nonprofessional and professional persons. Though the latter are not a 'representative' sample of the population, and their tastes probably differ in

many respects from the tastes of the rest of the population, it seems likely that, at least for comparisons among localities, the similarities are far more important than the differences.[2] In the absence of immobility, differences among communities in professional income might therefore be expected to parallel corresponding differences in income from other pursuits. Departures from parallelism might be interpreted as reflecting a different degree of mobility in the professions than in other pursuits, though obviously any conclusions reached in this indirect manner would be subject to numerous qualifications.

The existence of parallelism, however, cannot be interpreted as reflecting mobility in both professional and nonprofessional pursuits or as any indication of a close adjustment of incomes in different communities. Immobility as well as mobility might give rise to similar locational differences. Prosperity (or the reverse) is likely to be diffused among all classes of the population. The professional men selling services to the ultimate consumer—physicians, dentists, in lesser degree lawyers, etc.—are affected directly. Their incomes are likely to be large if their clients' incomes are; and in the absence of mobility large incomes will not lead to an influx of practitioners that would prevent the large incomes from being maintained. Professional men serving business enterprises—accountants, engineers, etc.—are also affected, though less directly. The fortunes of many enterprises are closely related to, or immediately affect, the fortunes of the communities in which they are located, and their prosperity may well be reflected in the prosperity of the professional workers whose services they purchase and who, in the absence of mobility, are secure from competition.

In this chapter we attempt to determine the character and magnitude of the existing differentials among communities in the level and variability of professional income and to compare

2 For example, cost of living differentials may well be one of the important factors affecting the relative desirability of different localities, and these are similar for professional and other persons at the same income level.

these differentials with those in the income of the public. We group communities by size and by region. The smallness of our samples necessitates fairly coarse groupings. We use from six to eight size of community groups, the exact number varying from profession to profession, and the nine Census regions.[8]

Only the questionnaires sent to lawyers and physicians in 1937 asked the respondent to designate the community in which he practised. In the other samples, location was inferred from the postmark on the returned envelope, an obviously inexact procedure. Some persons living in one community but practising in another may have posted the questionnaire from their homes rather than their offices. However, since the addresses to which the questionnaires were sent were taken from professional directories, most of them must have been business addresses. The information needed to fill out the questionnaire would ordinarily be on records at the place of business. Consequently, probably few were erroneously classified on the basis

[8] The size of community classes, in terms of the population of the communities in each class, are:

Physicians and dentists: under 2,500; 2,500–10,000; 10,000–25,000; 25,000–50,000; 50,000–100,000; 100,000–500,000; 500,000 and over.

Lawyers: under 2,500; 2,500–10,000; 10,000–25,000; 25,000–100,000; 100,000–250,000; 250,000–500,000; 500,000–1,500,000; 1,500,000 and over.

Certified public accountants: under 25,000; 25,000–100,000; 100,000–250,000; 250,000–500,000; 500,000–1,500,000; 1,500,000 and over.

Consulting engineers: under 5,000; 5,000–25,000; 25,000–100,000; 100,000–250,000; 250,000–500,000; 500,000–1,500,000; 1,500,000 and over.

The Census regions and the states in each are:

New England: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

Middle Atlantic: New York, New Jersey, Pennsylvania.

East North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin.

West North Central: Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas.

South Atlantic: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida.

East South Central: Kentucky, Tennessee, Alabama, Mississippi.

West South Central: Arkansas, Louisiana, Oklahoma, Texas.

Mountain: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada.

Pacific: Washington, Oregon, California.

TABLE 16

Arithmetic Mean Income, Relatives of Arithmetic Mean Income, and Number of Persons Covered, by Size of Community

SIZE OF COMMUNITY	PHYSICIANS 1929–36	DENTISTS 1929–34	LAWYERS 1932–36	CERTIFIED PUBLIC ACCOUNTANTS 1929–36	CONSULTING ENGINEERS 1929–32
	Arithmetic Mean Income[1] *(dollars)*				
1,500,000 & over	4,310	4,227	6,709	6,031	12,600
500,000–1,500,000			3,756	4,747	6,401
250,000– 500,000	4,812	3,838	4,286	5,435	5,678
100,000– 250,000			3,827	4,945	5,394
50,000– 100,000	4,913	3,721	3,791	4,475	4,574
25,000– 50,000	4,608	3,748			
10,000– 25,000	4,373	3,518	4,052	3,507	3,130
5,000– 10,000	3,600	2,982	2,538		
2,500– 5,000					4,933
Under 2,500	2,414	2,247	1,880		
U. S.	4,031	3,517	4,082	5,180	7,720
	Relatives of Arithmetic Mean Income (U. S. = 100)				
1,500,000 & over	106.9	120.2	164.4	116.4	163.2
500,000–1,500,000			92.0	91.6	82.9
250,000– 500,000	119.4	109.1	105.0	104.9	73.5
100,000– 250,000			93.8	95.5	69.9
50,000– 100,000	121.9	105.8	92.9	86.4	59.2
25,000– 50,000	114.3	106.6			
10,000– 25,000	108.5	100.0	99.3	67.7	40.5
5,000– 10,000	89.3	84.8	62.2		
2,500– 5,000					63.9
Under 2,500	59.9	63.9	46.1		
U. S.	100.0	100.0	100.0	100.0	100.0
	Number of Persons Covered[2]				
1,500,000 & over	1,168	581	230	1,283	149
500,000–1,500,000			154	556	121
250,000– 500,000	1,020	426	322	551	78
100,000– 250,000			270	421	37
50,000– 100,000	389	220	404	531	46
25,000– 50,000	397	242			
10,000– 25,000	568	333	321	257	22
5,000– 10,000	570	386	428		
2,500– 5,000					21
Under 2,500	1,022	337	400		
U. S.	5,193	2,559	2,545	3,624	474

[1] Computed by averaging averages for individual years in Tables B 3, B 5, B 8, B 10, and B 11.

[2] Actual number of persons covered by the returns used before any weighting or adjusting, i.e., the sum of the numbers of persons covered by the samples. We

of the postmark. Whatever ambiguity there is doubtless affects the groupings by size of community more than the groupings by region.[4]

1 LEVEL OF INCOME

a Size of community differences

The outstanding feature of Table 16 is the low average income of professional men in very small communities. If we may judge from the three professions (medicine, dentistry, law) for which we have segregated communities under 2,500 in population, average incomes in these communities are only one-half to two-thirds as large as in communities over 10,000 in population; and average incomes in communities of 2,500–10,000, about two-thirds as large. Engineering is the only profession in which the smallest communities segregated do not have the lowest average income: the income of engineers is apparently decidedly lower in communities of 5,000–25,000 and slightly lower in communities of 25,000–100,000 than in communities under 5,000. However, the averages for consulting engineers in these three community size groups are based on so few returns that the apparent exception may well be fortuitous.[5]

[4] A comparison of the number of lawyers listed in the *Martindale-Hubbell Law Directory* for some of the larger cities with the number listed in the 1930 *Census of Population* suggests that the difference between a classification of professional persons by residence and by location of practice may be sizable. According to the 1930 Census, 1,898 lawyers lived in Boston, while according to the 1936 legal directory, 4,374 lawyers practised there. Yet the totals for Massachusetts agree very well: the Census total is 6,940; the directory total, 7,150. (The figures on the names listed in the directory were kindly furnished to us by Martindale-Hubbell.)

[5] The difference between the averages for the two smallest size of community classes is less than twice its standard error.

Another possible explanation suggested to us by C. Reinold Noyes is that the high incomes in small communities may reflect the incomes of engineers specializing in mining.

FOOTNOTES TO TABLE 16 (cont.)

used the number reporting their incomes for the last year covered by each sample, i.e., for the 1933 samples, the number reporting 1932 incomes; for the 1935 samples, the number reporting 1934 incomes; for the 1937 samples, the number reporting 1936 incomes.

In the three business professions—law, accountancy, and engineering—average incomes are highest in the largest communities—those with populations over 1,500,000. The very high average in Table 16 for lawyers in the largest communities is for the most part attributable to extraordinarily high averages for that size of community from the second legal sample.[6] The corresponding averages from the first legal sample are larger than for any other size of community, but by a much smaller amount. The real excess in the average income of lawyers in the largest communities is probably nearer the 16 per cent excess suggested by Table 16 for accountants than the 64 per cent for lawyers. In dentistry also, average income is highest in the largest communities—this time those with populations over 500,000. In medicine, average income in communities of this size appears to be somewhat lower than in communities of intermediate size.

The intermediate size of community classes show little regularity. There is some tendency for average income to decrease with size of community, but this tendency is not clear-cut.

The averages in Table 16 on which these statements are based are for groups of communities that not only differ in size but also are concentrated in different parts of the United States. In consequence, what seems to be a size of community difference might really be a regional difference in disguise. We show in the Appendix to this chapter that this is not the case. For communities of the same size, regional differences in average income are not statistically significant for lawyers, accountants, or engineers and seem to be much less marked than size of community differences for physicians and dentists. Other computations we have made lead to the same general conclusion and indicate that averages corrected for differences in the regional composition of the size of community classes would differ merely in detail from those presented in Table 16 and the later tables of this section.

[6] These extraordinarily high values are due to the one firm commented on in Ch. 4, Sec. 1a.

The size of community differences in professional income are compared with corresponding differences in the income of the public in Table 17, the first column of which gives the National Resources Committee estimates of the 1935–36 average income of nonrelief families. So far as we know, these are the only available countrywide data on size of community differences in the income of the public. They are for size of community classes even broader than ours. To make the averages for the professions as nearly comparable as possible to those for nonrelief families, we have grouped the original size of community classes for the professions into those indicated in Table 17. In addition to the actual averages, the table gives relatives obtained by expressing the average income in each size of community class as a percentage of a national average.[7] The relatives are depicted in Chart 14.

The conclusion suggested by Table 17 is that both the general character and the magnitude of the size of community

[7] The national average used as the base of the relatives is a weighted arithmetic mean of the size of community averages. The weights are the same for all professions and for nonrelief families, and are the percentage of all nonrelief families in each size of community. The use of these 'standardized' averages yields relatives that are not affected by differences among the professions or between the professions and other occupations in size of community distributions.

The weights used are based on the percentage distribution of families by size of community in *Consumer Incomes in the United States,* Table 4B. The weight for communities with populations of 100,000–1,500,000 was apportioned among the relevant subclasses on the basis of the number of families of two or more persons recorded in the 1930 Census; and for communities with populations of 2,500–25,000, on the basis of population in 1930. The final weights used were the proper combinations of the accompanying estimated percentage distribution of nonrelief families. The 'under 2,500' class includes nonrelief families living on farms.

SIZE OF COMMUNITY	ESTIMATED % OF NONRELIEF FAMILIES
1,500,000 and over	11.3
500,000–1,500,000	5.4
100,000– 500,000	13.3
25,000– 100,000	10.4
5,000– 25,000	12.5
2,500– 5,000	3.9
Under 2,500	43.2

TABLE 17

Arithmetic Mean Income and Relatives of Arithmetic Mean Income, by Size of Community

Professions and All Nonrelief Families

SIZE OF COMMUNITY	NONRELIEF FAMILIES [1] 1935–36	PHYSICIANS 1929–36	DENTISTS 1929–34	LAWYERS 1932–36	CERTIFIED PUBLIC ACCOUNTANTS 1929–36	CONSULTING ENGINEERS 1929–32
			Arithmetic Mean Income (dollars)			
1,500,000 & over	2,704			6,709	6,031	12,600
500,000 & over		4,310	4,227			
100,000–1,500,000	2,177			4,004	5,038	5,996
100,000– 500,000		4,812	3,838			
25,000– 100,000	1,813	4,764	3,734	3,791	4,475	4,574
5,000– 25,000						3,130
2,500– 25,000	1,653	4,416	3,231	3,163		
Under 25,000					3,507	
Under 5,000						4,933
Under 2,500	1,408 [2]	2,414	2,247	1,880		
U. S. actual avg.	1,781	4,031	3,517	4,082	5,180	7,720
U. S. standardized avg. [3]		3,622	3,105	3,232	4,179	5,735
		Relatives of Arithmetic Mean Income (U. S. standardized avg. = 100)				
1,500,000 & over	151.8			207.6	144.3	219.7
500,000 & over		119.0	136.1			
100,000–1,500,000	122.2			123.9	120.6	104.6
100,000– 500,000		132.9	123.6			
25,000– 100,000	101.8	131.5	120.3	117.3	107.1	79.8
5,000– 25,000						54.6
2,500– 25,000	92.8	121.9	104.1	97.9		
Under 25,000					83.9	
Under 5,000						86.0
Under 2,500	79.1	66.6	72.4	58.2		
U. S. standardized avg.	100.0	100.0	100.0	100.0	100.0	100.0

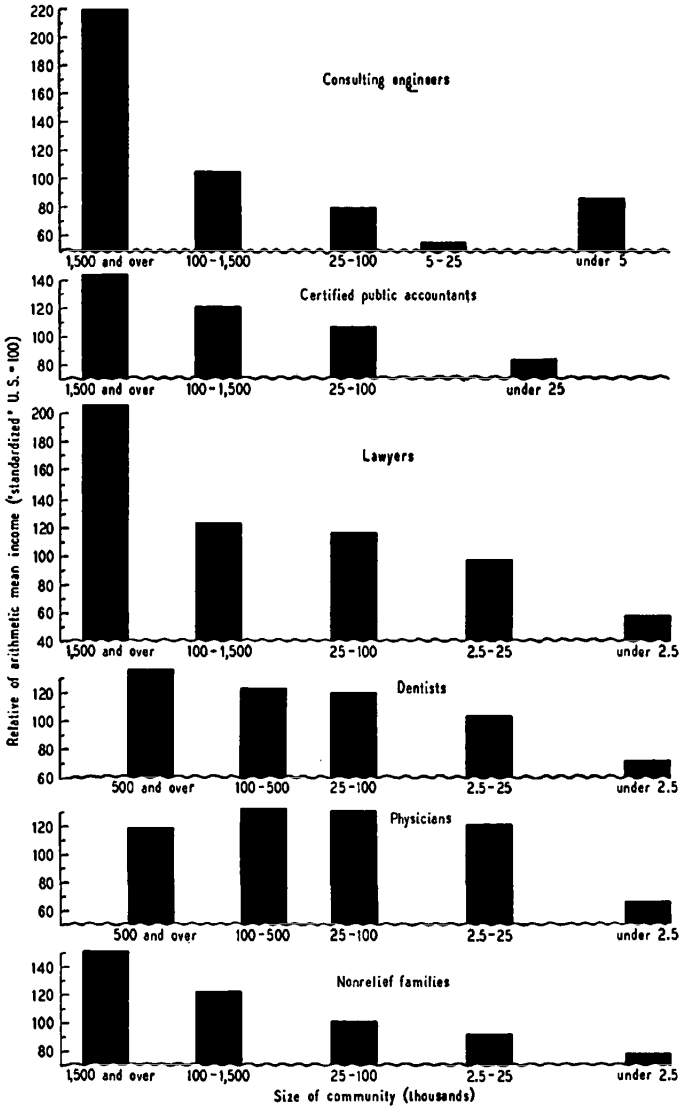
[1] Averages for nonrelief families are for the 12 months, July 1935 through June 1936; see *Consumer Incomes in the United States* (National Resources Committee, 1938), pp. 1, 23.

[2] National Resources Committee estimate for all rural communities.

[3] The standardized averages are weighted averages of the averages for each size of community, the weights being the estimated percentage of nonrelief families in each.

CHART 14

Relatives of Arithmetic Mean Income by Size of Community
Professions and All Nonrelief Families



differences in average income from independent professional practice in large part reflect similar differences in the average income of the public. The average income of nonrelief families decreases consistently with size of community from 150 per cent of the national average in communities over 1,500,000 in population to 80 per cent in communities under 2,500. Dentists, lawyers, and accountants follow exactly the same pattern, and physicians and consulting engineers deviate from it only slightly: physicians receive a lower average income in the largest communities than in any except the smallest; engineers receive a higher average income in the smallest communities than in the two preceding size of community classes. Though the dispersion of the relatives is about the same for the professional groups as for the public—for three professions it is somewhat smaller, for two, somewhat larger—size of community differences in professional income diverge more in magnitude than in pattern from those in the income of nonrelief families. Errors in our data apparently account for several of the more striking discrepancies, notably the relatively high income of lawyers in the largest communities, which is entirely attributable to the peculiarities of our second legal sample,[8] and the lack of agreement between the relatives for consulting engineers and nonrelief families, which probably reflects the smallness of our engineering sample. Chief among the discrepancies that cannot be so accounted for are the relatively low average income of physicians in communities over 500,000, revealed by each of the three medical samples separately as well as by the combined samples and independently confirmed for 1929 by the survey of the Committee on the Costs of Medical Care; [9] the relatively low income of physicians, dentists, and lawyers in very small communities; and the relatively high income of physicians and dentists in intermediate size communities.

[8] The first legal sample alone yields a relative of 144.7 as compared to a relative of 151.8 for nonrelief families.

[9] Leven, *Incomes of Physicians*, p. 35.

These discrepancies between the size of community differences in professional income and in the income of the public might be accounted for by many factors: certain nonpecuniary advantages of communities of varying size may apply to one profession but not to others or may be evaluated differently by members of one profession than by members of another or by the general public and this may be reflected in the relative supply of practitioners; size of community differences in the ease of entering practice or getting training that affect only certain professions may render mobility less in those professions than in others; size of community differences in the variability of income may not be the same for all professions or for the professions and the public and hence may lead to different relations among average incomes; there may be differences among the professions in the location or prosperity of clients that for one reason or another have not been fully offset by adjustments in the number of practitioners; size of community differences in the distribution of practitioners by number of years in practice may not be uniform for all professions, or if they are, the relation between income and experience may not be; and so on. Unfortunately, statistical data by size of community that would enable us to evaluate the importance of these factors are exceedingly scarce.

Data are available on the number of physicians practising in communities of different size; but alone, they are entirely inadequate. First, a high average income of the public at large would presumably mean both relatively many physicians per capita, and a relatively high income per physician. Second, a comparison of physicians per capita in communities of different size is misleading since physicians in cities are likely to draw their clientele from neighboring communities as well. The relatively large number of physicians per capita in communities with populations over 500,000 cannot be considered a satisfactory explanation of their relatively low incomes any more than the relatively small number of physicians per capita in communities with populations under 2,500 can be con-

sidered inconsistent with their relatively low incomes. Neither comparison is meaningful without further evidence on the relation between number of physicians and the average income of the public for a fixed income per physician, and on the population that is in some sense 'served' by the physicians in communities of each size.

In part, the relatively low income of physicians in large communities is attributable to a concentration of young men in those communities. But the data cited in the next chapter demonstrate that this is not the entire explanation: age class by age class physicians receive a lower average income in the largest communities than in communities of an intermediate size. Another possible explanation is that better medical facilities in very large cities constitute an attraction to physicians that has no counterpart in the other professions.

Interesting as these discrepancies are, they are overshadowed by the similarity among the professions and between the professions and the public at large in the general character and magnitude of size of community differences in income. As noted in the introduction to this chapter, this similarity is consistent with either mobility among communities of different size or immobility: with mobility, since differences in nonpecuniary advantages that would lead to differences in monetary returns might be expected to be much the same for men in different professions and for professional and nonprofessional men; with immobility, since differences in the prosperity of communities of different size might be expected to leave their impress on the incomes of professional men practising in them, an impress that in the absence of mobility would not be erased by an influx of new professional men, or by a departure of professional men in the community to better locations.

Alone, the data on size of community differences in income give no basis for choosing between these alternatives. But combined with data on regional differences in income, they may. Mobility among regions is probably less than among communi-

ties of different size. Individuals are likely to know more about economic and other conditions in communities of different size but in the same region than about conditions in widely separated communities. In addition, their background and associations, the desire to live near their families and friends, and their fears of the unknown are likely to set narrower limits on the region than on the size of the communities in which they feel free to practise. Consequently, if immobility is the explanation for the size of community differences, we should expect the even greater immobility among regions to lead to wide regional differences in professional incomes.

If, on the other hand, mobility is the explanation we might expect to find narrower regional than size of community differences. Cost of living almost certainly differs more between urban and rural communities in the same region than among urban communities in different regions, or rural communities in different regions. (Note that the most striking size of community differences are between very small communities and the rest.) While somewhat more dubious, it seems reasonable that nonpecuniary advantages also differ more among communities of different size than among regions. A resident of New York City could probably more easily change places with a resident of San Francisco than either could with a resident of a small village in the same state. Living in a large city implies an entirely different 'way of life' from living in a small community; living in one region rather than another rarely does.

We turn now to data on regional differences in professional income to see which interpretation of the size of community differences they support.

b Regional differences

Regional differences in the average income of professional men and the public at large are summarized in Table 18 [10]

[10] As in Table 17, the base of the relatives is a weighted average of the regional averages. The weights are the same for all professions and for the public at large and are the percentage of the total population in each region during 1929–36 (*Statistical Abstract for 1936*, Table 11).

TABLE 18

Arithmetic Mean Income, Relatives of Arithmetic Mean Income, and Number of Persons Covered, by Region

Professions and All Persons

	ALL PERSONS (per capita)[1] 1929–36	PHYSICIANS[2] 1929–36	DENTISTS[2] 1929–34	LAWYERS[2] 1932–36	CERTIFIED PUBLIC ACCOUNTANTS[2] 1929–36	CONSULTING ENGINEERS[2] 1929–32
			Arithmetic Mean Income (dollars)			
New England	623	4,860	3,778	4,253	4,961	6,327
Middle Atlantic	691	4,239	4,423	4,423	6,188	11,527
E. N. Central	517	4,075	3,225	5,427	4,905	5,854
W. N. Central	402	3,886	2,843	2,976	4,812	4,818
S. Atlantic	339	4,046	3,657	3,510	4,638	5,388
E. S. Central	220	3,174	2,640	3,690	4,727	
W. S. Central	295	3,294	3,269	2,866	4,609	4,176
Mountain	440	4,057	3,367	2,786	4,114	2,815
Pacific	653	4,282	3,762	4,141	4,118	4,450
U. S. actual avg.	486	4,031	3,517	4,082	5,180	7,720
U. S. standardized avg.[4]		4,000	3,530	4,057	5,018	6,537
			Relatives of Arithmetic Mean Income			
			(U. S. standardized avg. = 100)			
New England	128.2	121.5	107.0	104.8	98.9	96.8
Middle Atlantic	142.2	106.0	125.3	109.0	123.3	176.4
E. N. Central	106.4	101.9	91.4	133.8	97.7	89.6
W. N. Central	82.7	97.2	80.5	73.4	95.9	73.7
S. Atlantic	69.8	101.2	103.6	86.5	92.4	82.4
E. S. Central	45.3	79.4	74.8	91.0	94.2	
W. S. Central	60.7	82.4	92.6	70.6	91.8	63.9
Mountain	90.5	101.4	95.4	68.7	82.0	43.1
Pacific	134.4	107.0	106.6	102.1	82.1	68.1
U. S. standardized avg.	100.0	100.0	100.0	100.0	100.0	100.0
			Number of Persons Covered[3]			
New England		405	188	179	249	43
Middle Atlantic		1,027	489	407	1,276	196
E. N. Central		1,017	606	443	691	58
W. N. Central		593	403	437	190	30
S. Atlantic		514	207	254	356	36
E. S. Central		289	81	151	150	
W. S. Central		380	122	215	204	15
Mountain		323	118	217	132	10
Pacific		595	312	231	350	86
U. S.		5,193	2,559	2,545	3,624	474

and Chart 15. The estimates of the average income of the public during 1929–36 are computed from the Department of Commerce estimates of income by states, and purport to cover all income recipients. They are therefore somewhat more satisfactory for our purposes than the National Resources Committee estimates for nonrelief families we were forced to use in the size of community analysis.

There is a fair degree of similarity, both among the professions and between the professions and the public, in the direction of the regional differences.[11] Average incomes are relatively high in the Middle Atlantic, New England, and East North Central regions—all highly urbanized—and relatively low in the West North Central, Mountain, East South Central, and West South Central regions—the least urbanized. The Pacific region ranks near the top for the population as a whole, physicians, dentists, and lawyers, but is near the bottom for accountants and consulting engineers. The relation between regional differences in professional income and in the income of the public is closer for physicians and dentists than for the other professions. But even for these two professions the income differences, though similar in direction, are not very similar in magnitude to those for the population as a whole. In general, there is far less similarity between regional differences in professional income and in the income of the public than between size of community differences (cf. Tables 17 and 18).

[11] If the averages for all persons and each profession in Table 18 are ranked, the resulting table of ranks yields a χ_r^2 of 30.8, indicating a degree of consilience that would be exceeded by chance less than once in a thousand times.

FOOTNOTES TO TABLE 18

[1] Averages are based on state averages; see R. R. Nathan and J. L. Martin, *State Income Payments, 1929–37* (U. S. Department of Commerce, 1939).

[2] Computed by averaging averages for individual years in Tables B 3, B 5, B 8, B 10, and B 11.

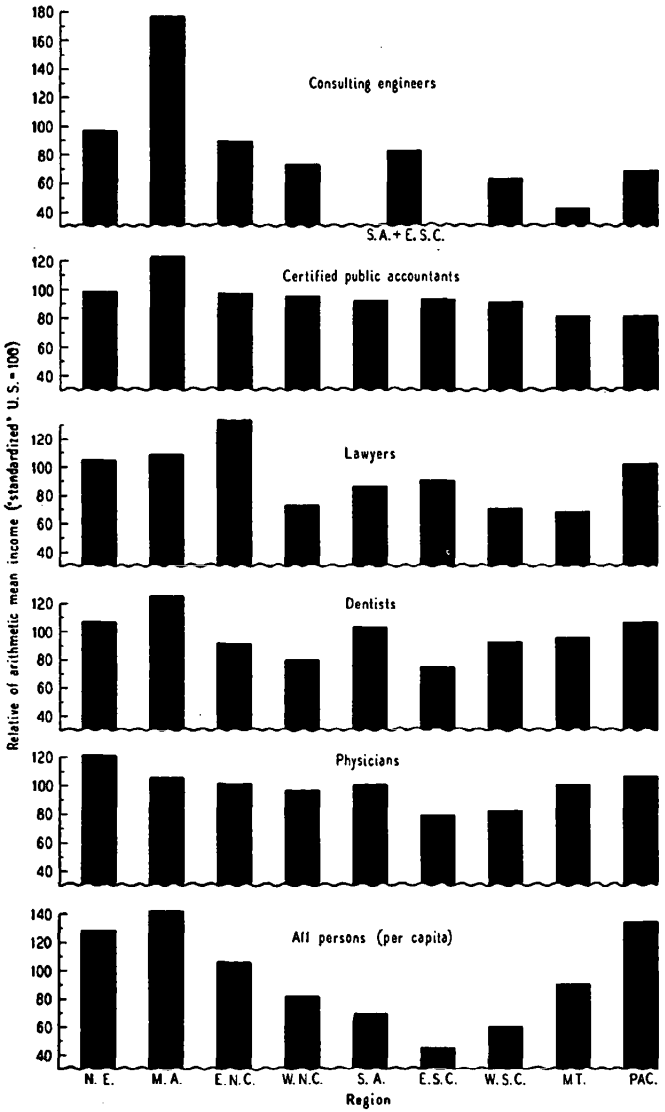
[3] Actual number of persons covered by returns used before any weighting or adjusting; see footnote 2 to Table 16.

[4] The standardized averages are weighted averages of the regional averages, the weights being the average percentage of the total population residing in each region, 1929–36.

CHART 15

Relatives of Arithmetic Mean Income by Region

Professions and All Persons



The regional averages for the professions are considerably less dispersed than the size of community averages, as Table 19 indicates. Despite the larger number of regional than of size of community classes and hence the greater opportunity for variation, the difference between the highest and lowest regional relatives is less than the difference between the highest and lowest size of community relatives for each profession. Moreover, these differences between the regional relatives

TABLE 19

Difference between Highest and Lowest Size of Community and Regional Relatives of Arithmetic Mean Income

	DIFFERENCE BETWEEN HIGHEST AND LOWEST RELATIVES FOR	
	SIZE OF COMMUNITY CLASSES [1]	REGIONS [2]
Public [3]	72.7	96.9
Physicians	66.3	42.1
Dentists	63.7	50.5
Lawyers	149.4	65.1
Certified public accountants	60.4	41.3
Consulting engineers	165.1	133.3

[1] Size of community classes used in Table 17.
[2] Regions used in Table 18.
[3] Size of community relatives based on data for all nonrelief families; regional relatives based on data for all persons.

overstate the differences attributable to region proper since the averages from which they have been computed represent geographic units that differ widely in degree of urbanization. While almost half of the residents of the Middle Atlantic region live in cities with populations over 100,000, fewer than one-eighth of the residents of the Mountain region live in cities of that size. And what is true of the population at large is no less true of professional groups. Almost two-thirds of the physicians in the Middle Atlantic region but only a quarter of the physicians in the Mountain region practise in cities over 100,000 in population. Hence, differences among the regional

averages so far presented must reflect the wide income differences among communities of different size described in the preceding section as well as income differences among communities of the same size but in different regions. Our finding that incomes are relatively high in the most urbanized regions and relatively low in the least urbanized suggests that the differences in the size of community composition of the regions may be responsible for much of the observed regional differences in income.

Tests of the existence of regional differences for communities of the same size and of size of community differences for communities in the same region are presented in Section 1 of the Appendix to this chapter. These tests give no evidence of any 'pure' regional differences in the incomes of lawyers, accountants, or engineers. For these professions the differences among the averages in Table 18 must be interpreted as reflecting differences in the size of community composition of the regions plus random error. Since the regional differences reflect the size of community differences only in 'diluted' form, it is clear why the former should be smaller (see Table 19). For physicians and dentists, 'pure' regional differences apparently exist. In Section 2 of the Appendix to this chapter we attempt to measure them by eliminating the influence of differences in the size of community composition of the regions. The results confirm the impression given by Table 19: the 'pure' regional differences are smaller than the differences among the crude regional averages in Table 18, and hence considerably smaller than the size of community differences.

A somewhat more detailed analysis of the relations among geographical differences in income, made possible by data on per capita income in each state, confirms and extends some of our findings. Rough measures of the relation between average professional income and per capita income in a state and between average income in different professions are presented in Table 20.

These rank difference correlation coefficients support our

earlier finding that the relation between per capita income and average income in medicine and dentistry is significant and closer than the relation between per capita income and average income in law and accountancy. The latter, on a state by state

TABLE 20

Rank Difference Correlation Coefficients between per Capita Income and Average Professional Income, and between Average Incomes in Different Professions, 1934 and 1936

48 States and the District of Columbia

SERIES COMPARED	RANK DIFFERENCE CORRELATION COEFFICIENTS FOR 1934	1936
Per capita income & income of		
Physicians	.382*	.427*
Dentists	.325*	
Lawyers [1]	.262	.112
Certified public accountants [2]	.036	—.081
Incomes of		
Physicians & dentists	.390*	
Lawyers [1] & certified public accountants [2]	.160	.340*
Physicians & lawyers [1]	.241	.060
Physicians & certified public accountants [2]	—.201	—.307*
Dentists & lawyers [1]	—.045	
Dentists & certified public accountants [2]	.069	

* Indicates that the coefficient is 'significant', i.e., greater than the value that would be exceeded by chance once in twenty times. Standard error of the correlation coefficient is between .14 and .15 for all coefficients in the table.

[1] The 1934 averages are for lawyers practising alone (i.e., exclude firm members); the 1936 averages are for all lawyers.

[2] Both the 1934 and 1936 averages are for accountants practising alone (i.e., exclude firm members).

basis, are not even statistically significant. Somewhat more novel are the results suggested by the correlations among professions. The four professions included in the table may be divided into the curative professions—medicine and dentistry—and the business professions—law and accountancy. Average incomes in the professions in each pair are significantly correlated; but there is little, or inverse correlation, between average incomes in a curative profession and a busi-

ness profession. The explanation presumably lies in the clientele served by the various professions. Physicians and dentists serve the population at large; in the short run, at least, their incomes depend primarily upon the incomes of the people in the communities in which they practise; consequently medical and dental incomes are correlated and both are correlated with per capita income. Accountants and lawyers, on the other hand, serve primarily business enterprises —accountants almost exclusively, and lawyers in large part. Moreover their services are not used in equal measure by all business enterprises; incorporated businesses and especially the relatively large ones, are their best customers. The demand of business enterprises for the services of accountants and lawyers may be none too closely related to the incomes of the business enterprises, and the incomes of business enterprises using the services of accountants and lawyers practising in an area are, in turn, only indirectly related to the average income of the residents of that area. It is not surprising, therefore, that the incomes of lawyers and of accountants in different states should be correlated and that both should be more tenuously related to per capita income than are the incomes of physicians and dentists.

All correlation coefficients between per capita income and average professional income are fairly low: diversity of per capita incomes accounts for a minor part of the diversity of professional incomes. Much of the residual diversity doubtless represents simply chance error arising from the smallness of our samples. But it seems reasonable that at least part is attributable to other factors.

Our data on regional differences in professional income leave little doubt that they are considerably smaller than size of community differences. According to the analysis presented at the end of the preceding section, this finding means that both sets of differences are to be interpreted as arising from mobility rather than immobility. The large size of community differences in professional income must reflect either differ-

ences in the net advantages attached to practising in communities of varying size or a general tendency for the abler men to be concentrated in the larger communities. Either interpretation implies that incomes in communities of varying size are adjusted to one another rather than maladjusted. Of course, this statement is intended only as a broad generalization and does not rule out the possibility that at least some part of the existing differentials is attributable to immobility (see Ch. 6, Sec. 2). The small regional differences are to be interpreted as reflecting the absence of wide differences in nonpecuniary advantages among communities of the same size but in different regions. Conceivably these small regional differences could also be consistent with large differences in nonpecuniary advantages rendered ineffective because mobility is absent. However, this alternative interpretation is hardly tenable, since it assumes the remarkable coincidence that immobility has prevented incomes from being as low as they otherwise would be in just those regions that have the greatest nonpecuniary advantages.

The neatness of the picture that can be pieced together from the data on differences in professional income is somewhat marred if we try to add to it the relationship between professional income and the income of the public at large. We saw earlier that size of community differences in professional income parallel those in the income of the public. If the former are consistent with mobility it seems reasonable that the latter are as well, since there is no reason to suppose that mobility in the professions would give rise to income differences similar to those that would arise in other pursuits in the absence of mobility. This interpretation would lead us to expect regional differences in the income of the public that not only parallel but also are of about the same magnitude as the regional differences in professional income. Professional and other workers would be unlikely to place the same evaluation on the nonpecuniary advantages of communities of varying size but different evaluations on the nonpecuniary advantages of regions.

In fact, however, the regional averages for the public are more widely dispersed than the averages for the professional groups (Tables 18 and 19). Only the sample for consulting engineers, the inconsistent behavior of which we have previously had occasion to note, does not conform to this generalization. Moreover, the greater dispersion is not attributable to a single high or low value of per capita income; if we exclude the highest and lowest, or the two highest and two lowest, or even the three highest and three lowest from all sets of relatives, per capita incomes consistently show the widest dispersion, not even consulting engineers being an exception. Regional averages for the public not only diverge more widely than regional averages for the professions; they also diverge more widely than size of community averages for the public. However, this relation would be reversed if the estimates of regional differences in the income of the public were based on the same data as the estimates of size of community differences, i.e., on the National Resources Committee estimates.[12]

Two possible explanations can be suggested of the apparent inconsistency among (1) the similarity of the size of community differences for the public and the professions, (2) the dissimilarity of the regional differences, (3) our interpretation of the differences in professional income as consistent with mobility. First, for reasons outlined at the end of the preceding section, there may be greater mobility among communities of varying size than among regions; the difference may exist in both professional and nonprofessional pursuits but be greater in the latter; hence, while it may not prevent adjustments in the professions, it may prevent them in other pursuits. Second, our data on professional incomes are for homogeneous occupa-

[12] The National Resources Committee estimates of the average income of nonrelief families are available for only five regions, broader than the Census ones (*Consumer Incomes in the United States*, p. 22). The difference between the highest and the lowest relatives computed from these figures is 32.6 as compared with the difference of 72.7 between the highest and lowest size of community relatives. The range of the regional relatives for all nonrelief families is about the same as the range of relatives computed for comparable regions for the professions.

tional groups; our data on the incomes of the public are not. It may be that, occupation by occupation, regional differences in the incomes of nonprofessional workers are of about the same magnitude as regional differences in the incomes of professional workers; that the apparently greater regional differences in the income of the public reflect differences in the industrial characteristics of the regions and hence in the occupational composition of the population; and that regions vary more in industrial characteristics than size of community classes.[18] While it is beyond the scope of this book to investigate these explanations in detail, since this would involve an intensive analysis of regional and size of community differences in the income of the public, the second explanation appears on the surface more reasonable than the first.

2 VARIABILITY OF INCOME

Variability of professional income in community size or regional groups can be studied by measuring the absolute variability of income about the arithmetic mean or median for each size of community or region; or by measuring the relative variability, the percentage deviations of individuals' incomes from the mean or median. In studying variability of incomes in each profession for the country as a whole (see Ch. 4) we noted that average income and absolute variability of income are positively associated. A graphical test of the existence of such an association between absolute variability and average income by community size groups is presented in Chart 16, and by regions, in Chart 17.

[18] A third possible explanation of the wider regional differences in the income of the public than in professional income is that the former includes income from property while the latter does not; but this explanation is not supported by the available data. To test it we computed regional relatives for 1930 of salaries and wages plus other labor income plus entrepreneurial withdrawals per gainfully occupied person. These relatives showed somewhat less dispersion than the relatives for 1930 computed from per capita incomes and the latter showed approximately the same dispersion as the relatives for 1929–36 per capita income given in Table 18; nonetheless they showed considerably greater dispersion than the relatives of professional income.

CHART 16

Relation between Standard Deviation and Arithmetic Mean; and between Interquartile Difference and Median, by Size of Community

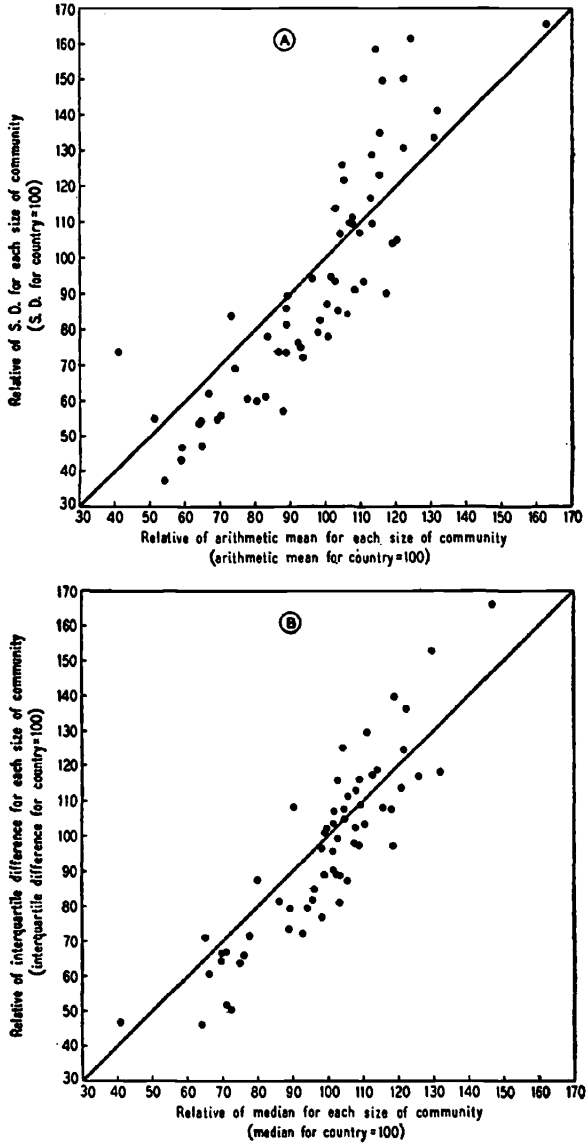
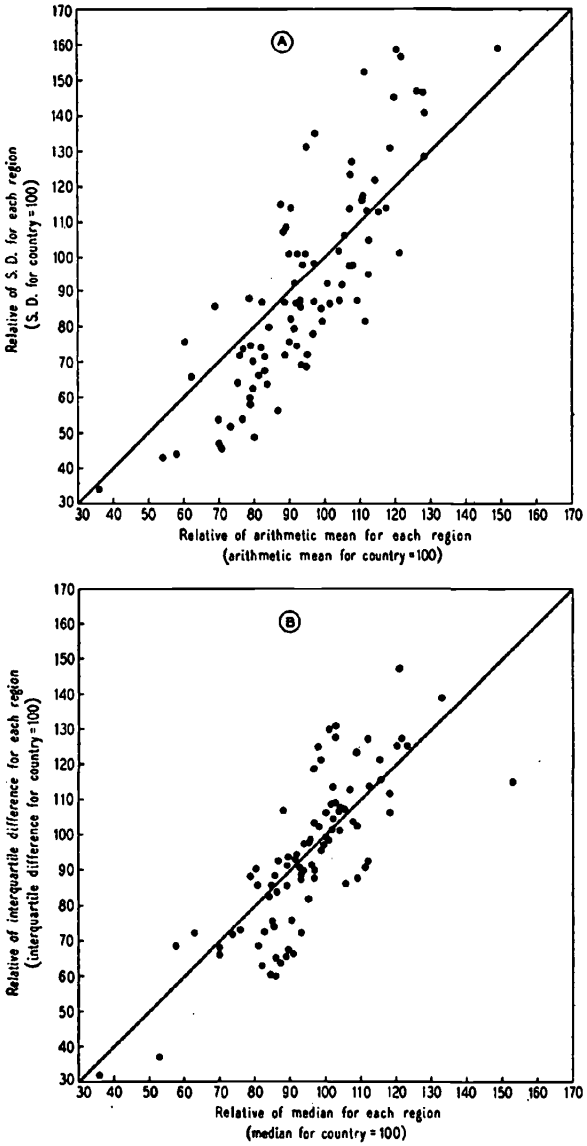


CHART 17

Relation between Standard Deviation and Arithmetic Mean; and between Interquartile Difference and Median, by Region



The meaning of the charts can best be indicated by describing one of the panels in detail. Each point on panel A of Chart 16 is for a particular size of community, profession, and sample. For example, the chart contains seven points based on the 1933 medical sample, one for each of the seven size of community classes. These points were computed as follows: (1) the arithmetic means for the four years covered by the sample—1929, 1930, 1931, 1932—were averaged for each size of community. This gave seven averages for this sample.[14] (2) The average for each size of community was divided by the corresponding average for the country. (3) These two steps were applied to the standard deviations, yielding ratios of the average standard deviation in each size of community to the average for the country.[15] (4) The ratio of the arithmetic mean for a size of community to the arithmetic mean for the country was plotted against the corresponding ratio of standard deviations, the former being measured on the horizontal axis, the latter on the vertical.

Dividing the size of community means and standard devia-

[14] Averages for the period covered by the sample were used instead of averages for individual years because of the high intercorrelation among the latter. Any one sample includes essentially the same individuals for each year it covers; the relations among communities of different size in one year are necessarily similar to those shown by the same sample for another year. Use of averages for each sample as a whole makes the points plotted on the charts independent.

[15] The average standard deviation for the country used as the base of the ratios was a weighted average of the standard deviations for the seven size of community classes, the weights being the average number of physicians reporting in each. This average was used instead of the actual standard deviation computed from the countrywide frequency distribution of income because the latter (1) includes the differences among as well as within size of community classes; (2) implicitly involves a different weighting system since it essentially represents a weighted average of the squares of the standard deviations for the seven size of community classes. As a result, ratios based on the actual standard deviation would have differed in 'level' from sample to sample and profession to profession.

These difficulties do not apply to the arithmetic means. Nevertheless the same procedure was followed for consistency. The resulting weighted average incomes for the country differed only slightly from those obtained by averaging the original nationwide averages.

tions by the countrywide means and standard deviations yields ratios that are comparable from sample to sample and profession to profession; consequently, points for different samples and professions can all be plotted on the same chart. Stated differently, this procedure eliminates both temporal and professional differences in level of income and absolute variability. Aside from random variation, size of community differences alone remain.[16]

Panel B of Chart 16 was constructed in the same way as panel A except that medians were used instead of means, and interquartile differences instead of standard deviations. Chart 17 was also constructed in the same way, except that the data are for regions.

It is clear from the charts that there are marked size of community and regional differences in absolute variability of professional income, and that these differences are highly correlated with corresponding differences in level of income. An analysis of size of community and regional differences in absolute variability would therefore duplicate the analysis of differences in level of income presented in Section 1. In consequence, we restrict our analysis to relative variability—variability measured in percentages rather than dollars.

The evidence on size of community and regional differences in relative variability is summarized in Tables 21 and 22 and Charts 18 and 19. The size of community and regional groups for the professions have been condensed to permit comparison with measures of variability for all nonrelief families computed from the National Resources Committee estimates of the distribution of income by size for the year 1935–36.[17] The

[16] The size of community classes differ from profession to profession. This is relatively unimportant since the mean and standard deviation (or median and interquartile difference) represented by any point are for the same class.

[17] For Table 21, giving data by size of community, the National Resources Committee rural nonfarm and farm distributions were combined simply by adding the two distributions expressed in terms of number of families in each income class. This method was not followed in grouping size of community classes for the professions. Rather a weighted average of the measures of variability was computed, the weights being the average number of returns over the period.

(Footnote continued on p. 205)

TABLE 21

Coefficient of Variation and Relative Interquartile Difference, and Relatives of Coefficient of Variation and Relative Interquartile Difference, by Size of Community

Professions and All Nonrelief Families

SIZE OF COMMUNITY	ALL NONRELIEF FAMILIES [1] 1935–36	PHYSICIANS [2] 1929–34	DENTISTS [2] 1929–34	LAWYERS [2] 1932–34	CERTIFIED PUBLIC ACCOUNTANTS [2] 1929–36	CONSULTING ENGINEERS [2] 1929–32
			Coefficient of Variation			
1,500,000 & over	1.494			1.272	.855	1.398
500,000 & over		1.305	1.002			
100,000–1,500,000	1.389			1.209	.726	1.331
100,000– 500,000		1.220	.741			
25,000– 100,000	1.288	.990	.704	1.265	.633	.995
5,000– 25,000						6.207
2,500– 25,000	1.080	.966	.550	1.079		
Under 25,000					.701	
Under 5,000						1.536
Under 2,500	1.149	1.012	.588	.794		
U. S. standardized avg.[3]	1.227	1.079	.683	1.021	.716	2.010
			Relatives of Coefficient of Variation (U. S. standardized avg. = 100)			
1,500,000 & over	121.8			124.6	119.4	69.6
500,000 & over		120.9	146.7			
100,000–1,500,000	109.1			118.4	101.4	66.2
100,000– 500,000		113.0	108.5			
25,000– 100,000	105.0	91.7	103.1	123.9	88.4	49.5
5,000– 25,000						308.8
2,500– 25,000	88.0	89.5	80.5	105.7		
Under 25,000					97.9	
Under 5,000						76.4
Under 2,500	93.6	93.8	86.1	77.8		
U. S. standardized avg.	100.0	100.0	100.0	100.0	100.0	100.0
			Relative Interquartile Difference			
1,500,000 & over	.789			1.497	.927	1.764
500,000 & over		1.242	.969			
100,000–1,500,000	.841			1.587	.749	1.539
100,000– 500,000		1.165	.827			
25,000– 100,000	.825	1.174	.818	1.534	.764	1.183
5,000– 25,000						2.708
2,500– 25,000	.883	1.097	.708	1.270		
Under 5,000						3.180
Under 25,000					.726	
Under 2,500	.927	1.282	.772	1.057		
U. S. standardized avg.[3]	.878	1.218	.807	1.290	.757	2.446

TABLE 21 (cont.)

SIZE OF COMMUNITY	ALL NONRELIEF FAMILIES[1] 1935–36	PHYSICIANS[2] 1929–34	DENTISTS[2] 1929–34	LAWYERS[2] 1932–34	CERTIFIED PUBLIC ACCOUNTANTS[2] 1929–36	CONSULTING ENGINEERS[2] 1929–32
	Relatives of Relative Interquartile Difference (U. S. standardized avg. = 100)					
1,500,000 & over	89.9			116.0	122.5	72.1
500,000 & over		102.0	120.1			
100,000–1,500,000	95.8			123.0	98.9	62.9
100,000– 500,000		95.6	102.5			
25,000– 100,000	94.0	96.4	101.4	118.9	100.9	48.4
5,000– 25,000						110.7
2,500– 25,000	100.6	90.1	87.7	98.4		
Under 25,000					95.9	
Under 5,000						130.0
Under 2,500	105.6	105.3	95.7	81.9		
U. S. standardized avg.	100.0	100.0	100.0	100.0	100.0	100.0

[1] Computed from distributions in *Consumer Incomes in the United States*, Tables 8 and 9B.
[2] The measures in this table were computed from Tables B 1b, B 4b, B 6b, B 9b, and B 11b by averaging the measures for all the years covered for each profession and combining the resulting averages into broader size of community classes, using as weights the average number of returns for the period in each size of community class.
[3] The standardized averages are weighted averages of the averages for each size of community class, the weights being the percentage of all nonrelief families in each.

tables give not only the actual measures but also relatives obtained by expressing the actual measures as percentages of a national average.[18] The charts are based on these relatives.

This gives, in general, lower measures of variability than would be obtained by combining the frequency distributions. However, test computations indicated that the difference in the results obtained by the two methods was negligible for the coefficient of variation. Though somewhat more sizable for the relative interquartile difference, the conclusions reached would not be changed if the alternative method of combining the size of community classes were used.

The measures for the professions in Table 22 for broader regions are also weighted averages of the measures for the individual regions, the weights being the average number of returns over the period, and are subject to the same qualification as the measures for broader size of community classes.

Because of the necessity of weighting by states, no frequency distributions were computed by size of community for the 1937 medical sample. In this as in all other analyses of variability, the 1937 legal sample was omitted for reasons given in Chapter 4, Section 1b.

[18] The base of the relatives is in each case the weighted average of the relevant size of community or regional measures, the weights used being the same for all professions and for nonrelief families. For the size of community measures, the weights are the percentage of all nonrelief families in each size of community given in footnote 7 above. For the regional measures, the weights are the percentage of the total population residing in each region during 1929–36.

TABLE 22

Coefficient of Variation and Relative Interquartile Difference, and Relatives of Coefficient of Variation and Relative Interquartile Difference, by Region

Professions and All Nonrelief Families

REGION[1]	ALL NONRELIEF FAMILIES[2] 1935–36	PHYSICIANS[3] 1929–36	DENTISTS[3] 1929–34	LAWYERS[3] 1932–34	CERTIFIED PUBLIC ACCOUNTANTS[3] 1929–36	CONSULTING ENGINEERS[3] 1929–32
			Coefficient of Variation			
New England	1.475	1.002	.633	1.164	.636	1.984
North Central	1.369	1.039	.777	1.176	.830	1.489
South	1.242	1.098	.814	1.307	.671	.980
Mountain & Plains	.939	1.073	.633	1.278	.668	1.406
Pacific	1.179	1.139	.732	1.402	.560	1.100
U. S. standardized avg.[4]	1.297	1.064	.766	1.238	.739	1.335
			Relatives of Coefficient of Variation (U. S. standardized avg. = 100)			
New England	113.7	94.2	82.6	94.0	86.1	148.6
North Central	105.6	97.7	101.4	95.0	112.4	111.5
South	95.8	103.2	106.3	105.6	90.9	73.4
Mountain & Plains	72.4	100.8	82.6	103.2	90.5	105.3
Pacific	90.9	107.0	95.6	113.2	75.9	82.4
U. S. standardized avg.	100.0	100.0	100.0	100.0	100.0	100.0
			Relative Interquartile Difference			
New England	.749	1.152	.857	1.784	.879	2.551
North Central	.810	1.100	.830	1.443	.885	1.666
South	1.157	1.273	.748	1.442	.746	1.383
Mountain & Plains	.926	1.166	.751	1.354	.827	1.630
Pacific	.759	1.082	.798	1.263	.612	1.838
U. S. standardized avg.	.914	1.158	.800	1.446	.819	1.650
			Relatives of Relative Interquartile Difference (U. S. standardized avg. = 100)			
New England	81.9	99.5	107.1	123.4	107.3	154.6
North Central	88.6	95.0	103.8	99.8	108.1	101.0
South	126.6	109.9	93.5	99.7	91.1	83.8
Mountain & Plains	101.3	100.7	93.9	93.6	101.0	98.8
Pacific	83.0	93.4	99.8	87.3	74.7	111.4
U. S. standardized avg.	100.0	100.0	100.0	100.0	100.0	100.0

For professions other than engineering and law, the size of community differences in the coefficient of variation are similar in both character and magnitude from profession to profession and for the professions and all nonrelief families: the coefficient of variation tends to be greatest for the very largest communities, to decline more or less regularly to the next to the smallest size of community class, and then to rise. This pattern is confirmed by data both for more detailed size of community classes and for individual samples.[19] The coefficients of variation for lawyers display the initial decline, but not the later rise; those for engineers are exceedingly erratic, possibly because of the small number of returns on which they are based. These two professions, which show least agreement, are the only ones for which the measures in Table 21 and Chart 18 are based on a single sample.

The general character of the size of community differences is the same for the coefficient of variation as for the arithmetic mean (see Sec. 1 above): both measures tend to decline with size of community. However, there is one striking difference. While the arithmetic mean in the very smallest communities is decidedly lower than in any other size of community class, the

[19] See Appendix Tables B 1b, B 4b, B 6b, B 9b, and B 11b.

FOOTNOTES TO TABLE 22

[1] Regions are those used by the National Resources Committee. The New England and Pacific regions are the same as the corresponding Census regions; North Central includes the Middle Atlantic, the East North Central, and part of the West North Central Census regions; South includes the South Atlantic, the East South Central, and the West South Central Census regions; Mountain and Plains includes the Mountain and part of the West North Central Census regions.

[2] Computed from distributions in *Consumer Incomes in the United States*, Table 13B.

[3] The measures in this table were computed from Tables B 1a, B 4a, B 6a, B 9a, and B 11a by averaging the measures for all the years covered for each profession and combining the resulting averages into broader regions, using as weights the average number of returns for the period in each region.

[4] The standardized averages are weighted averages of the regional averages, the weights being the average percentage of the total population residing in each region, 1929–36.

CHART 18

Relatives of Coefficient of Variation and Relative Interquartile Difference by Size of Community
Professions and All Nonrelief Families

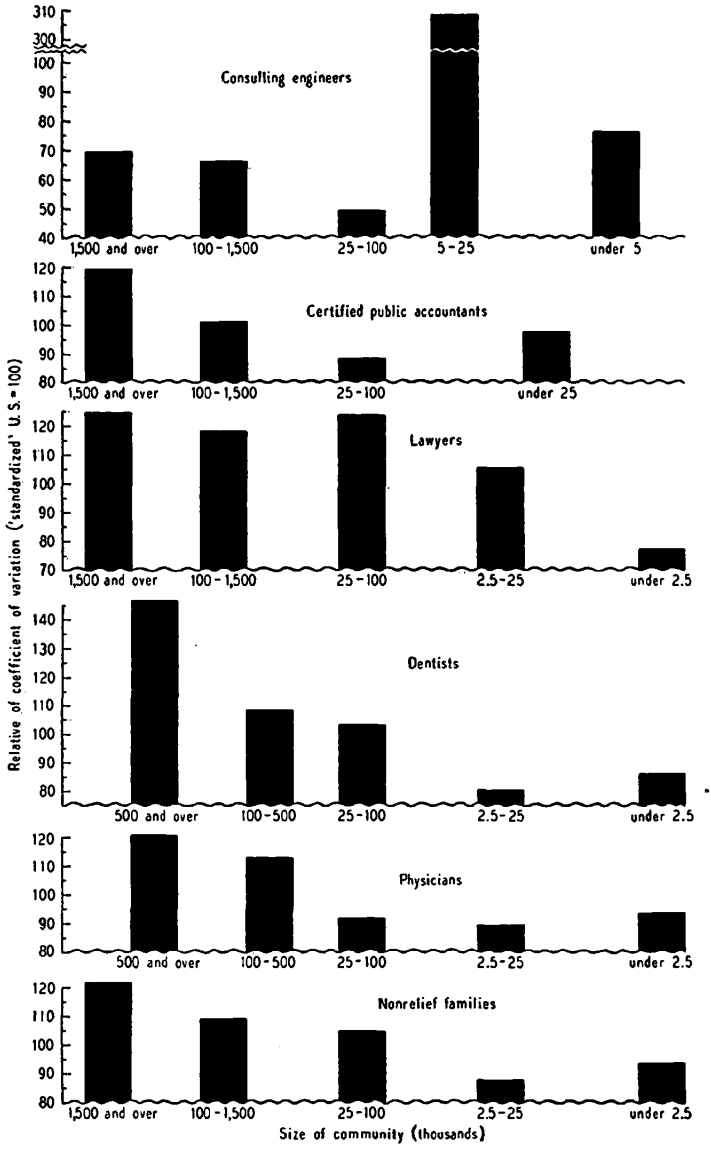


CHART 18 (CONCL.)

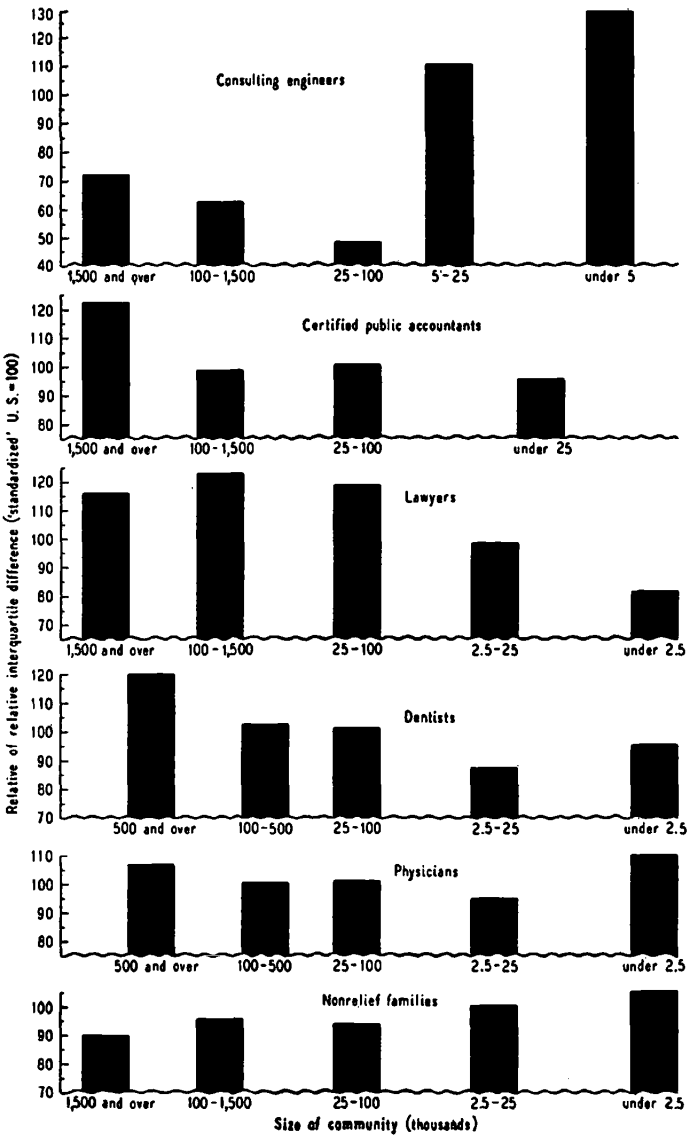


CHART 19

Relatives of Coefficient of Variation and Relative Interquartile Difference by Region

Professions and All Nonrelief Families

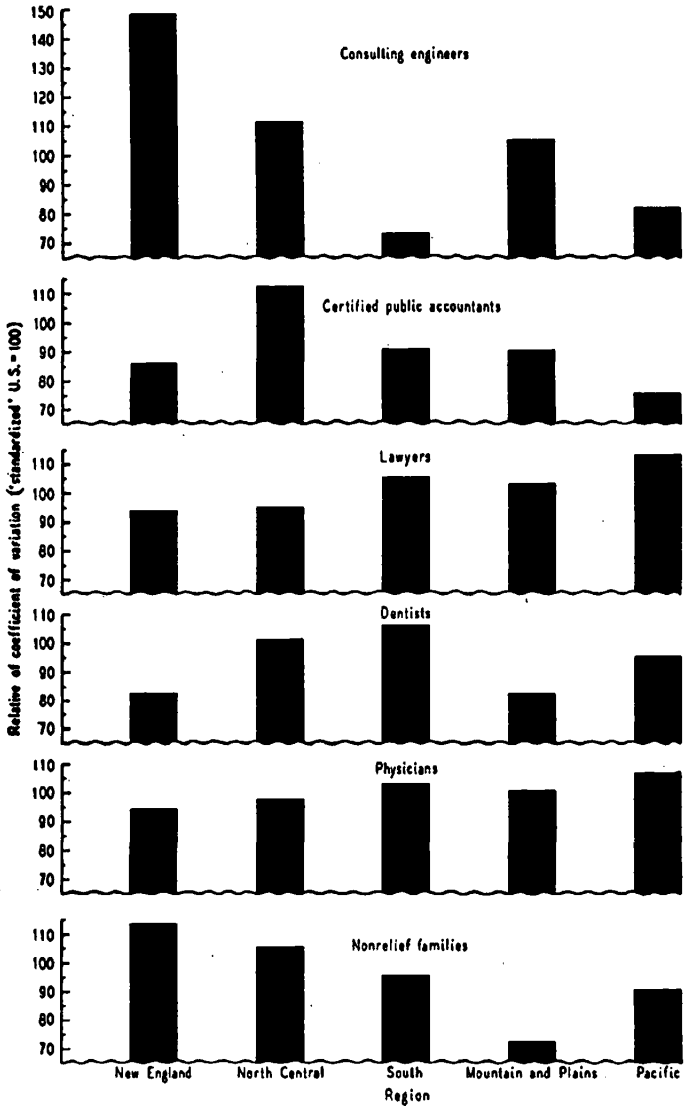
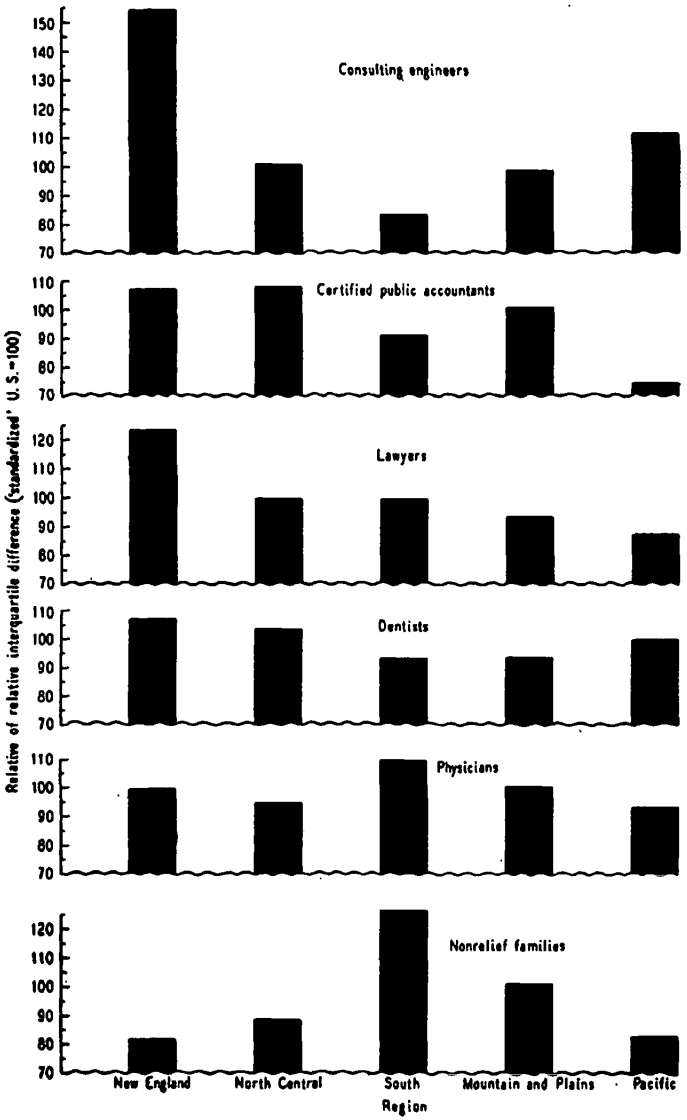


CHART 19 (CONCL.)



coefficient of variation is higher in the smallest than in the next to the smallest size of community class for all families and for three of the five professions. True, these differences are in the main small, but their consistency not only from profession to profession but also from sample to sample suggests that they are not fortuitous.

The similarity between the professions and all nonrelief families in the size of community differences in the coefficient of variation accords with expectation. Many of the factors that make for size of community differences in the income distribution of the population as a whole presumably affect distributions of professional income as well. Moreover, at least for physicians and dentists (and to some extent, lawyers) the connection is even more intimate. Differences in the incomes of practitioners in large part reflect differences in 'prices' charged consumers. The extent to which it is possible to vary 'prices' charged in turn clearly depends on the variability in consumers' incomes. It is therefore to be expected that differences in the relative variability of professional incomes will parallel differences in the relative variability of incomes in general. (See Ch. 4, Sec. 3.)

Our data are not entirely consistent with this interpretation. It would lead us to expect not only the coefficient of variation but also the relative interquartile difference to be similar for the professions and the public at large. No such similarity is revealed by Table 21 and Chart 18. The relative interquartile differences for nonrelief families tend to be larger the smaller the community; the relative interquartile differences for the professions behave irregularly and whatever consistent variation exists is in the opposite direction. The different rankings of the size of community classes by the relative interquartile difference and the coefficient of variation are not necessarily inconsistent. The relative interquartile difference measures a different aspect of the income distribution than the coefficient of variation: the former measures primarily variability in the lower part of the income distribution;

the latter, primarily variability in the upper part.[20] Two distributions that are identical except that one contains a few incomes higher than any in the other will have different coefficients of variation but may have the same relative interquartile differences. Presumably, this is roughly the situation in the income distributions of nonrelief families in cities of different size. The extremely high incomes tend to be found in the very large cities. In consequence, while the relative interquartile difference increases as size of community declines, the coefficient of variation declines. But why should the lower part of the income distribution of all families impress its pattern on the distributions of professional income less than the upper?

One clue to this puzzle is that the relative interquartile difference varies less from size of community to size of community than the coefficient of variation. Chance variation in the former measure might more easily hide a real relationship than chance variation in the latter.[21] Indeed it is conceivable that the relative interquartile difference for all families is the same for all size of community classes and that the observed differences in the measures reflect errors of estimate. Study of the Lorenz curves for all nonrelief families in the several size of community classes lends some support to this hypothesis: the major differences are in the upper parts, the lower parts are fairly similar. However, the evidence is far too meagre to enable us to state with any confidence that differences among the size of community classes in relative variability are restricted to the upper parts of the income distributions.

A second possibility, applicable solely to the professions

20 This statement is valid only for distributions that are sharply skewed in the same direction as income distributions.

21 However, it is also possible that with sharply skewed distributions of the kind with which we are concerned, the coefficient of variation computed by the ordinary method is subject to greater sampling variability than the relative interquartile difference, and that for this reason the coefficients of variation are more widely dispersed than the relative interquartile differences. While the consistency of the differences among the coefficients of variation argues against this interpretation, it does not negate it.

rendering services directly to the ultimate consumer, is that there tends to be a lower limit set by custom to the prices charged. At income levels below those at which higher prices are feasible, differences in the variability of consumers' incomes may be reflected primarily in the number of practitioners and may leave no impress on their income distribution. Differences in the variability of incomes of the practitioners who serve these income classes would then be attributable to factors other than the variability of consumers' incomes.

Still a third possibility is that the size of community differentials in the coefficients of variation for nonrelief families reflect the size of community differentials in the coefficients of variation for independent professional men, their salaried brethren, and independent and salaried businessmen, rather than the reverse. As we saw in Chapter 3, the incomes of independent professional families are not only higher than those of other groups but also much more variable, and this is also true of business and professional families as a group. In 1935–36 independent professional families were less than 1.5 per cent of all nonrelief families in the United States, but 17 per cent of all nonrelief families with incomes over $5,000. All entrepreneurial families—independent business and independent professional families combined—were only 11 per cent of all nonrelief families but 42 per cent of those with incomes over $5,000. Finally, business and professional families combined—salaried and independent—were 20 per cent of all nonrelief families but almost 80 per cent of those with incomes over $5,000. Hence these groups, the variability of whose incomes might be expected to arise from much the same factors, dominate the part of the income distributions primarily responsible for differences in the coefficient of variation. Moreover, the concentration of these groups in large communities would be an additional factor tending to make the coefficient of variation decline with size of community. The wage-earning and clerical groups, on the other hand, dominate the lower part of the income distributions except in communities under 2,500

where farmers are concentrated. The relative interquartile differences for all families may reflect primarily the low variability of income for these groups. Farm families have more variable incomes than wage-earning and clerical families, which is probably the reason why the interquartile difference for all families is highest in communities under 2,500.

This third possible explanation of our results is not necessarily inconsistent with the two others mentioned; but it does suggest that we are in no position to give a satisfactory explanation, on other than purely statistical grounds, of the observed size of community differences in the variability of income.

The data on regional differences in relative variability in Table 22 and Chart 19 reveal little or no similarity among the professions or between the professions and nonrelief families, whether relative variability is measured by the coefficient of variation or the relative interquartile difference. More detailed data—for nine regions and each sample separately—confirm the absence of any similarity among the professions. If, as in Table 23, we rank the coefficients of variation and the relative interquartile differences for each sample in order of magnitude, the resulting sets of ranks are exceedingly chaotic.[22] The degree of consilience shown by the whole set of ranks of the coefficient of variation would be exceeded by chance well over half the time; that shown by the set of ranks of the relative interquartile difference, more than one-tenth the time.[23]

The absence of any similarity among the professions in regional differences in relative variability may well mean that such differences are small or nonexistent, the observed differences reflecting primarily random variation. We know that there are some regional differences, at least for the coefficient of variation. As we have repeatedly had occasion to note, the

[22] The data on which the ranks are based are given in Appendix Tables B 1a, B 4a, B 6a, B 9a, and B 11a.

[23] Probability statements based on values of χ_r^2 computed for the table of ranks. χ_r^2 is 6.3 for the coefficients of variation, 12.7 for the relative interquartile differences.

TABLE. 23

Ranking of Regions by Coefficient of Variation and by Relative Interquartile Difference

	PHYSICIANS			DENTISTS		LAWYERS	CERTIFIED PUBLIC ACCOUNTANTS			CONSULTING ENGINEERS
	1933 sample	1935 sample	1937 sample	1933 sample	1935 sample	1935 sample	1933 sample	1935 sample	1937 sample	1933 sample
	Ranking by Coefficient of Variation									
New England	7	5	6	6	9	6	6	5	8	1
Middle Atlantic	8	7	4	2	1	7	3	2	1	2
E. N. Central	5	1	9	4	5	5	2	1	3	5
W. N. Central	3	6	8	7	7	8	8	4	2	3
S. Atlantic	4	4	3	3	2	9	1	9	5	8
E. S. Central	2	3	1	8	8	3	9	8	6	
W. S. Central	6	9	7	1	6	2	5	3	7	7
Mountain	9	2	2	9	4	1	4	7	4	4
Pacific	1	8	5	5	3	4	7	6	9	6
	Ranking by Relative Interquartile Difference									
New England	5	8	3	1	6	1	2	6	1	1
Middle Atlantic	7	5	6	2	1	2	1	2	7	5
E. N. Central	8	7	9	6	2	6	3	4	4	7
W. N. Central	4	6	4	5	5	5	4	7	3	4
S. Atlantic	3	4	1	3	4	4	8	8	5	8
E. S. Central	1	2	2	4	7	3	7	3	8	
W. S. Central	2	3	7	9	9	7	5	1	6	2
Mountain	9	1	8	8	8	8	6	5	2	6
Pacific	6	9	5	7	3	9	9	9	9	3

Ranking is from high to low. The ranks are based on averages of the relevant measures for the years covered by each sample for each region. The measures for each year are presented in Tables B 1a, B 4a, B 6a, B 9a, and B 11a.

regions differ considerably in size of community composition. Consequently, the size of community differences in the coefficient of variation noted above should be reflected in the regional measures of variability. However, in the absence of differences among communities of the same size but in different regions, this indirect effect might be fairly small and easily obscured by chance fluctuations.

Comparison of the coefficients of variation for regions and

TABLE 24

Difference between Highest and Lowest Size of Community and Regional Relatives of Coefficient of Variation and Relative Interquartile Difference

	DIFFERENCE BETWEEN HIGHEST AND LOWEST RELATIVES OF COEFFICIENT OF VARIATION FOR		DIFFERENCE BETWEEN HIGHEST AND LOWEST RELATIVES OF RELATIVE INTERQUARTILE DIFFERENCE FOR	
	Size of community classes [1]	Regions [2]	Size of community classes [1]	Regions [2]
All nonrelief families	33.8	41.3	15.7	44.7
Physicians	31.4	12.8	15.2	16.5
Dentists	66.2	23.7	32.4	13.6
Lawyers	46.8	19.2	41.1	36.1
Certified public accountants	31.0	36.5	26.6	33.4
Consulting engineers	259.3	75.2	81.6	70.8

[1] Size of community classes used in Table 21.
[2] Regions used in Table 22.

for size of community classes in general supports the hypothesis that regional differences are considerably smaller than size of community differences. The evidence is summarized in Table 24, the first two columns of which compare the difference between the highest and lowest size of community relatives of the coefficient of variation with the difference between the highest and lowest regional relatives. The ranges are comparable because, except for accountants, the number of size of community classes is the same as the number of regional classes. For four of the five professions the range of the size of community relatives is greater than the range of the regional relatives, and for all four, the former is more than twice the

latter. The difference in the opposite direction for accountants is small. The range of the regional relatives for all nonrelief families, on the other hand, is greater than the range of the size of community relatives,[24] and is also greater than the range of the regional relatives for all the professions except engineering.

The ranges for the relative interquartile difference (last two columns of Table 24) are in interesting contrast to the ranges for the coefficient of variation. For three of the six groups, the range of the size of community relatives exceeds the range of the regional relatives, but for only one is the former more than twice the latter; for the other two as well as for two of the three groups showing a difference in the opposite direction, the difference is small. In general, differences between the two columns are of an order that might arise from chance alone.

The differences between the ranges for the coefficients of variation are not in themselves sufficient to establish conclusively that regional differences in the variability of professional income are small or nonexistent as compared with size of community differences.[25] But together with the low degree of consistency between different samples for the same profession, they at least establish a strong presumption in that direction. This presumption is further strengthened by its agreement with the conclusion stated earlier in this chapter that regional differences in levels of income, if they exist, are far less important

[24] However, this result seems to be inconsistent with the Lorenz curves for nonrelief families. The Lorenz curves based on the size of community distributions are not only more widely dispersed than those based on the regional distributions but are also more consistent. With one exception, the size of community Lorenz curves occupy the same order throughout their length; the regional Lorenz curves, on the other hand, change order repeatedly; their order at one end is practically the reverse of their order at the other.

[25] Testing whether the mean difference for the five professions between the two columns based on the coefficient of variation differs significantly from zero yields a Student's ratio of 1.59 with a probability between .2 and .1 of being exceeded in absolute value by chance. Taking into account the fact that the mean difference is in the expected direction would halve the probability. Student's ratio for the two columns based on the relative interquartile difference is 1.18 with a probability between .4 and .3 of being exceeded by chance.

than size of community differences. That we should again find size of community the more important category is not surprising.

3 SUMMARY

The major statistical findings of this chapter are:

1) The size of community differences in the frequency distributions of income by size are similar in character and magnitude from profession to profession and are much the same for professional workers as for the public at large.

2) The level of income tends to decline with size of community.

3) The coefficient of variation also tends to decline with size of community but is greater for the very smallest communities than for communities somewhat larger; the relative interquartile difference behaves erratically.

4) There is some similarity among the professions and between the professions and the public at large in the character, but practically none in the magnitude, of the regional differences in level of income.

5) There is little or no similarity among the professions or between the professions and the public in the magnitude or character of regional differences in variability of income.

6) Regional differences in both level and variability of income are probably greater for the public than for professional workers.

7) For the professions, size of community differences in income are decidedly greater than regional differences; for the public, the relation is uncertain.

The absence of large differences in professional income from region to region suggests that there is sufficient geographical mobility among professional workers to prevent large differences from arising or being maintained. And this, in turn, suggests that the much larger size of community differences must also be interpreted as consistent with mobility, since it seems unlikely that mobility is less among communities varying in size than among regions.

This interpretation of the differences in professional income implies a similar interpretation of the size of community differences in the income of the public, since the latter are about the same as those in professional income. The final piece to the puzzle, the regional differences in the income of the public, does not fit into its appointed place. If these differences too are attributable to mobility, as the analysis up to this point would suggest, they should be about the same as the regional differences in professional income whereas they are considerably wider. Two possible explanations of this apparently contradictory result were offered but neither was tested: greater mobility of workers in nonprofessional pursuits among communities varying in size than among regions; and the heterogeneous occupational composition of the groups to which our income data for the public relate.

APPENDIX TO CHAPTER 5

1 TESTS OF THE EXISTENCE OF REGIONAL AND SIZE OF COMMUNITY DIFFERENCES IN AVERAGE INCOME

Table 25 illustrates the kind of data needed to measure differences in the average incomes of professional men practising in different regions but in communities of the same size, or in communities varying in size but in the same region. The smallness of the sample on which the table is based makes necessary rather coarse regional and size of community groupings. As a result, the influence of size of community is not entirely eliminated from regional comparisons, and the influence of region is not entirely eliminated from size of community comparisons.

To test the existence of regional differences in average income we

TABLE 25

Arithmetic Mean Income and Number of Persons Covered, by Region and Size of Community

Physicians, 1934: 1935 Sample

SIZE OF COMMUNITY	NE	MA	ENC	WNC	SA	ESC	WSC	MT.	PAC.	ALL REGIONS
					Arithmetic Mean Income (dollars)					
500,000 & over	6,167	3,485	3,615	3,096	8,348	...	...	...	2,669	3,697
100,000–500,000	2,918	3,249	3,506	3,623	4,268	3,370	2,991	3,310	3,307	3,411
50,000–100,000	4,226	4,372	4,644	4,920	4,209	7,783	2,779	...	3,212	4,244
25,000– 50,000	4,704	3,732	3,899	4,789	4,631	1,176	4,305	2,668	4,304	3,966
10,000– 25,000	3,932	4,024	3,691	3,068	3,131	3,743	3,458	6,636	4,561	3,944
2,500– 10,000	2,879	3,131	3,651	3,389	2,499	1,779	3,134	3,755	2,686	3,071
Under 2,500	2,142	2,409	2,058	2,119	1,830	1,310	1,381	3,988	2,001	2,045
All size of community classes	4,010	3,400	3,377[2]	3,117[3]	3,637[4]	2,461	2,571	4,041	3,120	3,296[1]
					Number of Persons Covered					
500,000 & over	24	162	112	18	10	...	...	...	50	376
100,000–500,000	24	35	41	42	30	31	33	18	41	295
50,000–100,000	15	17	27	9	16	1	9	...	8	102
25,000– 50,000	13	17	21	7	8	3	4	9	10	92
10,000– 25,000	14	35	34	15	16	8	13	11	17	163
2,500– 10,000	11	29	24	23	11	13	9	8	10	138
Under 2,500	13	45	67	54	33	27	33	14	16	302
All size of community classes	114	340	330[2]	169[3]	125[4]	83	101	60	152	1,497[1]

[1] Includes 29 returns, reporting a total income of $54,452, for which size of community or region was unknown.

[2] Includes 4 returns, reporting a total income of $7,135, for which size of community was unknown.

[3] Includes 1 return, reporting an income of $2,191, for which size of community was unknown.

[4] Includes 1 return, reporting an income of $598, for which size of community was unknown.

rank the regions by size of average income for each size of community class (Table 26). The first section of the table gives the ranks for the size of community classes in which all regions are represented, the second for all size of community classes and the regions common to them. The two sets of ranks have been prepared from the one table of averages to overcome the difficulty

TABLE 26

Ranking of Regions by Arithmetic Mean Income, by Size of Community

Physicians, 1934: 1935 Sample

SIZE OF COMMUNITY	NE	MA	ENC	WNC	SA	ESC	WSC	MT.	PAC.
	All Regions, Five Size of Community Classes								
100,000–500,000	9	7	3	2	1	4	8	5	6
25,000– 50,000	2	7	6	1	3	9	4	8	5
10,000– 25,000	4	3	6	9	8	5	7	1	2
2,500– 10,000	6	5	2	3	8	9	4	1	7
Under 2,500	3	2	5	4	7	9	8	1	6
Sum of ranks	24	24	22	19	27	36	31	16	26
Avg. rank	4.8	4.8	4.4	3.8	5.4	7.2	6.2	3.2	5.2
	Six Regions, All Size of Community Classes								
500,000 & over	2	4	3	5	1				6
100,000–500,000	6	5	3	2	1				4
50,000–100,000	4	3	2	1	5				6
25,000– 50,000	2	6	5	1	3				4
10,000– 25,000	3	2	4	5	6				1
2,500– 10,000	4	3	1	2	6				5
Under 2,500	2	1	4	3	6				5
Sum of ranks	23	24	22	19	28				31
Avg. rank	3.3	3.4	3.1	2.7	4.0				4.4

Ranking is from high to low.

raised by the gaps in the latter table: 'cells' for which no observations are available.[1] To test the existence of size of community differences, we rank the size of community classes for each region

[1] Most of the gaps reflect the absence of communities of the specified size in the specified region; e.g., there is no city with a population over 500,000 in the East South Central, West South Central, or Mountain regions. A few of the gaps reflect the absence of any returns in the sample although the region contains communities of the specified size; e.g., there is one city in the Mountain region with a population between 50,000 and 100,000, but our medical sample includes no returns from it.

(Table 27). Tables 26 and 27 are, of course, both derived from Table 25.

The ranks in Table 27 display considerably more regularity than those in Table 26, suggesting that size of community differences are larger and more consistent than regional differences. To check these impressions we computed from the average ranks at

TABLE 27

Ranking of Size of Community Classes by Arithmetic Mean Income, by Region

Physicians, 1934: 1935 Sample

	500,000 & OVER	100,000–500,000	50,000–100,000	25,000–50,000	10,000–25,000	2,500–10,000	UNDER 2,500
	All Regions, Five Size of Community Classes						
New England		3		1	2	4	5
Middle Atlantic		3		2	1	4	5
E. N. Central		4		1	2	3	5
W. N. Central		2		1	4	3	5
S. Atlantic		2		1	3	4	5
E. S. Central		2		5	1	3	4
W. S. Central		4		1	2	3	5
Mountain		4		5	1	3	2
Pacific		3		2	1	4	5
Sum of ranks		27		19	17	31	41
Avg. rank		3.0		2.1	1.9	3.4	4.6
	Six Regions, All Size of Community Classes						
New England	1	5	3	2	4	6	7
Middle Atlantic	4	5	1	3	2	6	7
E. N. Central	5	6	1	2	3	4	7
W. N. Central	5	3	1	2	6	4	7
S. Atlantic	1	3	4	2	5	6	7
Pacific	6	3	4	2	1	5	7
Sum of ranks	22	25	14	13	21	31	42
Avg. rank	3.7	4.2	2.3	2.2	3.5	5.2	7.0

Ranking is from high to low.

the bottom of each section of Tables 26 and 27 a statistic designated χ_r^2 and determined the probability that the observed χ_r^2 would have been exceeded by chance, i.e., that chance alone would have produced differences among the average ranks as great as or greater than the observed differences.[2] χ_r^2 is 7.9 and 3.8 respec-

[2] See Friedman, 'The Use of Ranks to Avoid the Assumption of Normality Implicit in the Analysis of Variance'.

tively for the two parts of Table 26; either value would be exceeded by chance more frequently than once in twenty times, indicating that the observed regional differences in average rank might easily have been obtained by chance. Table 27 yields decidedly different results: χ_r^2 is 16.9 and 21.6 respectively, and these values would have been exceeded by chance less than once in a hundred times. It is unreasonable to suppose that the observed differences are attributable to chance alone.

Similar calculations were made for the other medical samples and for the other professions. All the tests are for the last year of the period covered by a particular sample.[3] In addition, joint tests of the different samples for the same profession were made by combining the sets of ranks for the different samples in one table. For example, the five sets of ranks for physicians in the first section of Table 26, and similar sets for 1932 from the 1933 sample and for 1936 from the 1937 sample were placed one under the other, yielding a final table with fifteen sets of ranks. The averages of the fifteen ranks in each column were then used to compute χ_r^2.

The results of these tests are summarized in Table 28. The values of χ_r^2 in lines 5 and 6 provide tests of size of community differences; those in lines 7 and 8, tests of regional differences. The values of χ_r^2 that would be exceeded by chance less than once in a thousand times are designated by (‡), those that would be exceeded by chance less than once in a hundred times by (†), and those that would be exceeded by chance less than once in twenty times by (*). The other values would be exceeded by chance more than once in twenty times.

The most striking feature of Table 28 is the almost complete absence of low values of χ_r^2 in lines 5 and 6, and the paucity of high values in lines 7 and 8. Only 3 of the 24 values in lines 5 and 6 but 16 of the 24 values in lines 7 and 8 are less than the value that

[3] Since the averages for different years from the same sample are for essentially the same individuals, they are highly intercorrelated. As a consequence, χ_r^2's computed for the different years covered by the same sample would not be independent and would add little to the information given by the χ_r^2 for a single year. Tests were made to see whether using the average income for the entire period covered by the sample would add much information or yield different results. Since practically the same results were obtained, we restricted the analysis to one year for each sample. The last year covered by each sample was used because more individuals reported for this year than for earlier years and because the data are presumably less biased.

would be exceeded by chance more than once in twenty times. These results mean that size of community differences in average income almost indisputably exist, but that the existence of regional differences is somewhat dubious.

The only low values in lines 5 and 6 are for the last accountancy sample and the engineering sample. The values for the earlier accountancy sample belie those for the last; moreover, the values for the two samples combined are higher than for either sample separately, suggesting that the size of community differences among the 1936 averages, irregular though they are, are in the same direction as those among the 1934 averages. The one value for engineers would be exceeded by chance approximately once in five times; nonetheless it is considerably larger than the value, 2.7, that reflects regional differences.[4] Moreover, the regional and size of community classes used for engineers are so few and broad that real differences might easily fail to produce a significant value of χ_r^2. These considerations as well as the results for the other professions suggest that we should not be justified in concluding that the small value of χ_r^2 reflects the absence of real size of community differences in the average income of consulting engineers.

The tests of regional differences tell a different story. None of the values for lawyers and accountants is statistically significant; nor is the one value we have for engineers.[5] Only for physicians and dentists is there any evidence that region, by itself, has a real influence on income level. For physicians, both values from the first sample and one of the values from the three samples combined would be exceeded by chance less than once in a hundred times. The test for all samples using only six regions yields a value that would be exceeded by chance more than once in twenty times. Since we are here concerned with regional differences, the test using all regions is the more important. To check the evidence afforded

[4] The two values of χ_r^2 are comparable because both are based on the same number of degrees of freedom.

[5] Not only are these values not significant on a .05 level of significance; none is even close to being significant. The two values for the separate legal samples would be exceeded by chance well over half the time, the value for the two legal samples combined about one-third the time. For accountants the three values in line 7 would be exceeded by chance more than one-third, one-tenth, and one-fifth the time respectively; the three values in line 8, one-fifth, one-third, and one-tenth the time respectively; the one value for consulting engineers would be exceeded by chance slightly more than one-half the time.

TABLE 28

Tests of the Significance of Size of Community and Regional Differences in Arithmetic Mean Income

	PHYSICIANS				DENTISTS			LAWYERS[2]			CERTIFIED PUBLIC ACCOUNTANTS[3]			CONSULTING ENGINEERS[5]
	1932	*1934*	*1936*	*All samples*	*1932*	*1934*	*Both samples*[1]	*1934*	*1936*	*Both samples*	*1934*	*1936*	*Both samples*[4]	*1932*
							Number of Classes							
Tests based on all regions: no. of														
1 Regions	9	9	9		9	9		9	9		9	9		4
2 Size of community classes	5	5	5		5	4		6	6		4	3		4
Tests based on all size of community classes: no. of														
3 Regions	6	6	6		6	6					6	6		4
4 Size of community classes	7	7	7		7	7					5	5		4
							Value of χ_r^2							
Tests of size of community differences based on														
5 All regions	24.7‡	16.9†	15.1†	51.5‡	23.2‡	19.1‡	33.0‡	21.7‡	16.6†	37.1‡	13.7†	4.1	14.5‡	5.1
6 All size of community classes	18.1†	21.6†	13.4*	44.7‡	22.3†	18.9†	37.0‡				13.3†	5.0	14.4†	
Tests of regional differences based on														
7 All regions	25.2†	7.9	10.9	21.3†	22.8†	13.2	26.3‡	6.8	3.7	7.8	8.1	12.2	10.6	2.7
8 All size of community classes	17.3†	3.8	8.5	4.8	13.9*	11.8*	23.1‡				7.1	5.4	7.5	

* Greater than the value that would be exceeded by chance less than once in twenty times.

† Greater than the value that would be exceeded by chance less than once in a hundred times.

‡ Greater than the value that would be exceeded by chance less than once in a thousand times.

The values that would be exceeded by chance less than once in twenty, a hundred, and a thousand times respectively for line 5 are 9.5, 13.3, and 18.5 for physicians and the 1932 data for dentists; 7.8, 11.3, and 16.3 for the other data for dentists and for the 1934 data for accountants; 11.1, 15.1, and 20.5 for lawyers; 6.2, 8.7, and 11.6 for the 1936 data for accountants; 6.0, 9.2, and 13.8 for the two accountancy samples combined; and 7.5, 9.3, and 11.1 for engineers. For line 6 these values are 12.6, 16.8, and 22.5 for physicians and dentists; and 9.5, 13.3, and 18.5 for accountants. For line 7 they are 15.5, 20.1, and 26.1 for all professions except engineers; for engineers they are 7.5, 9.3, and 11.1. For line 8 they are 11.1, 15.1, and 20.5 for all professions. These values are derived from χ^2 tables and certain exact distributions of χ_r^2 given by Milton Friedman, 'The Use of Ranks to Avoid the Assumption of Normality Implicit in the Analysis of Variance', *Journal of the American Statistical Association*, Dec. 1937, pp. 688–9.

[1] In computing the value in line 5, we used four size of community classes. In computing the value in line 7, however, we used the five size of community classes available for 1932.

[2] Since for lawyers all size of community classes are represented in only two regions, we limited the analysis to all regions and six size of community classes.

[3] The 1933 accountancy sample was tabulated considerably earlier than the other samples and before we became aware of the firm member bias discussed in Chapter 2. The national, regional, and size of community averages were later adjusted for this bias, but the averages for the size of community and regional cells were not. This accounts for the omission of the first accountancy sample.

The comparisons designated 'all size of community classes' are based on only five of the six size of community classes used for accountants. Since all six size of community classes are represented in only two regions, we omitted communities with populations over 1,500,000 in order to include six regions.

[4] In computing the value in line 5, we used three size of community classes. In computing the value in line 7, however, we used the four size of community classes available for 1934.

[5] Broader regional and size of community groups were used for consulting engineers than for the other professions. The resulting 4 x 4 table had no empty 'cells'. The regions used are New England and Middle Atlantic; East North Central and West North Central; South Atlantic, East South Central, and West South Central; Mountain and Pacific. The size of community classes are under 25,000, 25,000–100,000, 100,000–500,000, 500,000 and over.

by our data, we applied a similar test to the data of the Committee on the Costs of Medical Care on the 1929 incomes of physicians.[6] Unfortunately, only data on *gross* income by region and size of community are available from this survey, while the tests so far cited are all for *net* income. Further, our 1933 sample yields a higher value of χ_r^2 when the regions are ranked by the size of average gross income than when they are ranked by average net income, suggesting that regional differences in gross income are more marked than in net income.[7] The data of the Committee on the Costs of Medical Care therefore give only an indirect check on our results and may be expected to overstate the importance of differences in *net* income. Using the nine Census regions and six size of community classes, we obtained a value of 27.2 for χ_r^2. This value would be exceeded by chance less than once in a thousand times.

Table 28 gives somewhat stronger evidence of regional differences in dental incomes than in medical incomes. Not only are three of the four values of χ_r^2 'significant', but also both values for the two samples combined are greater than the values for the individual samples. The value obtained using all regions would be exceeded by chance less than once in a hundred times; that using all size of community classes, less than once in a thousand times. However, it should be borne in mind in interpreting these results that our dental data relate solely to American Dental Association members. The only conclusion that can be drawn from the evidence is that the average income of dentists who were members of the American Dental Association in 1933 and 1935—the years the samples were taken—and who live in the same size of community differs from region to region. The proportion of dentists who are members of the American Dental Association varies considerably among regions—in 1936 from 70 per cent in the Mountain region to 55 per cent in the Middle Atlantic region—and presumably the relation between the incomes of members and nonmembers also varies considerably. Correction for the restriction of our samples to members might have a sizable effect on the regional differences in

[6] Leven, *Incomes of Physicians*, p. 113.

[7] The values of χ_r^2 obtained from the *gross* income data for 1932 are 29.8 for the test using all regions and 19.5 for the test using all size of community classes. The corresponding values obtained from the *net* income data are 25.2 and 17.3 (see Table 28).

income. Unfortunately, a satisfactory correction of this bias by region and size of community is not possible.

2 REGIONAL DIFFERENCES IN THE AVERAGE INCOME OF PHYSICIANS AND DENTISTS

The averages in Tables 16 and 17 in the text of this chapter are for size of community classes that are not geographically homogeneous; and in Table 18, for regions that differ in size of community composition. In consequence, differences among the size of community averages mirror the effect of both size of community and region; and so do differences among the regional averages. The tests in the preceding section demonstrate that regional differences are small or nonexistent for lawyers, accountants, and engineers practising in communities of the same size. For these professions, therefore, the geographic heterogeneity of the size of community classes is unimportant; differences among the 'crude' size of community averages are adequate measures of differences among corresponding communities in the same region, and differences among the 'crude' regional averages are disguised size of community differences.

For physicians and dentists, 'pure' regional differences apparently exist, and hence the 'crude' size of community and regional average incomes are inaccurate measures of the income differences properly attributable to each factor. As noted in the text, the distortion in the size of community averages is negligible because regional differences are so much smaller than size of community differences. The distortion in the regional averages is more serious, and the differences among the regional averages in Table 18 cannot be interpreted as even approximate measures of differences in the incomes of individuals practising in communities of the same size but in different regions. In this section, we attempt to measure these differences more accurately.

To eliminate the influence of size of community we compute 'standardized' regional averages analogous to the standardized death rates so common in vital statistics. For each region we have averages for communities of several sizes. The averages for physicians and dentists in Table 18, and in the columns headed 'Actual' of Table 29, are weighted averages of these size of community averages, the weights being the number of physicians or dentists included in our samples and therefore varying from region to

TABLE 29

Arithmetic Mean Income Standardized with Respect to Size of Community, and Relatives of Actual and Standardized Arithmetic Mean Income, by Region

Physicians and Dentists

	ARITHMETIC MEAN INCOME[1]				RELATIVES OF ARITHMETIC MEAN INCOME (all or six regions = 100)			
	All size of community classes		Excl. some size of community classes[2]		All size of community classes		Excl. some size of community classes[2]	
	Actual	Stand.[4]	Actual	Stand.[4]	Actual	Stand.	Actual	Stand.
	(dollars)							
	Physicians (1929–36)							
New England	4,860	4,764	4,538	4,181	116.1	113.8	117.6	108.4
Middle Atlantic	4,239	4,186	4,233	4,109	101.2	100.0	109.7	106.5
E. N. Central	4,075	4,003	3,838	3,813	97.3	95.6	99.5	98.8
W. N. Central	3,886	4,309	3,708	3,864	92.8	102.9	96.1	100.2
S. Atlantic	4,046	4,665	3,635	3,634	96.6	111.4	94.2	94.2
E. S. Central	3,174[3]		3,208	3,475			83.2	90.1
W. S. Central	3,294[3]		3,231	3,224			83.7	83.6
Mountain	4,057[3]		4,057	3,978			105.2	103.1
Pacific	4,282	4,095	4,487	4,234	102.3	97.8	116.3	109.7
All regions	4,031		3,858	3,858			100.0	100.0
Six regions	4,187	4,187			100.0	100.0		

			Dentists (1929–34)					
New England	3,778	3,695	3,670	3,442	105.6	103.3	114.9	107.8
Middle Atlantic	4,423	4,143	3,645	3,570	123.7	115.8	114.1	111.8
E. N. Central	3,225	3,169	2,796	2,857	90.2	88.6	87.5	89.4
W. N. Central	2,843	2,954	2,763	2,930	79.5	82.6	86.5	91.7
S. Atlantic	3,657	4,037	3,498	3,368	102.2	112.9	109.5	105.4
E. S. Central	2,640[3]		2,660	2,707			83.3	84.8
W. S. Central	3,269[3]		3,299	3,128			103.3	97.9
Mountain	3,367[3]		3,354	3,322			105.0	104.0
Pacific	3,762	3,655	3,780	3,573	105.2	102.2	118.3	111.9
All regions	3,517		3,194	3,194			100.0	100.0
Six regions	3,577	3,577			100.0	100.0		

[1] These averages were computed separately for each year and sample. They were linked into a continuous series by the procedure described in the footnotes to Tables B 3 and B 5. The averages for six or all regions were computed directly (i.e., they are not averages of the regional averages in this table), and are based on actual averages rather than on the weighted averages used in computing the regional standardized averages.

[2] The size of community classes excluded are 50,000–100,000 and 500,000 and over; for dentists, the 10,000–25,000 class also is excluded.

[3] Some size of community classes not represented.

[4] The standardized averages are weighted averages of the size of community averages for each region. For physicians, the weights are the estimated number of physicians in 1931 in each size of community class for the country as a whole given by R. G. Leland, *Distribution of Physicians in the United States* (American Medical Association, 1936), Table 42. For dentists, the weights are averages, for each size of community class, of the number of dentists reporting their 1932 income in the 1933 and 1935 samples.

region. We can, however, combine the size of community averages using weights that are the same from region to region. Since the resulting averages are for hypothetical regions with the same size of community composition, the influence of size of community is eliminated. Two sets of standardized averages are given in Table 29: one, for the six regions in which all the size of community classes are represented; the other, for all regions but excluding size of community classes not represented in all regions.[8]

When the influence of differences in the size of community composition of the regions is eliminated, the range between the highest and lowest relatives is reduced by between 20 and 25 per cent, as the following tabulation indicates.

	DIFFERENCE BETWEEN HIGHEST AND LOWEST RELATIVES	
	Actual	'Standardized'
Physicians		
All size of community classes	23.3	18.2
Excluding some size of community classes	34.4	26.1
Dentists		
All size of community classes	44.2	33.2
Excluding some size of community classes	35.0	27.1

[8] The size of community classes excluded are 50,000–100,000 and 500,000 and over; for dentists, the 10,000–25,000 class also is excluded. These size of community classes are excluded either because some regions contain no communities of the specified size or because for some years and regions our samples include no returns from individuals practising in communities of the specified size.

For physicians, the weights used in computing the 'standardized' averages are the estimated number of physicians in active practice in 1931 in each size of community class for the country as a whole given by Leland, *Distribution of Physicians*, Table 42. For dentists, the weights were obtained by averaging, for each size of community, the number of dentists reporting their 1932 income in the 1933 and 1935 samples.

It should be noted that the standardized averages depend on the particular weights used in combining averages for communities of different size, and that these weights are in large measure arbitrary. For example, we could have used as weights the size of community distribution of professional men in a single region, instead of in the country as a whole, and any one of the nine regions might have been used. If the regional differences are about the same for each size of community, approximately the same results should be obtained no matter what set of weights are used, so long as the same weights are used for all regions. Of course, varying the weights will increase or reduce the likelihood that peculiarities in the figures for a particular size of community will affect the standardized averages.

The two sets of standardized averages show important differences. The average income of physicians in the South Atlantic region is 11 per cent above the average for all regions according to the set for all size of community classes, but 6 per cent below the average for all regions according to the set that excludes some size of community classes. The average income of physicians in the Pacific region is 2 per cent below the average in all regions according to the first set, but 10 per cent above according to the second. Similarly, the average income of dentists in the Pacific region is 2 per cent above the average in all regions according to the first set of standardized averages, but 12 per cent above according to the second. These differences may of course reflect variation in the regional differences from size of community to size of community—a possibility we cannot test with our meagre data. But we suspect that the differences arise from random variation. In any event, the existence of such differences suggests that the averages in Table 29 are subject to a wide margin of error. The broad conclusions they suggest are probably accurate but it would be exceedingly hazardous to use them as precise measures of the difference between one region and another.

No matter which set of standardized averages we use, physicians in New England rank relatively high with an average income about 10 per cent above the average for the country; in the Middle Atlantic and West North Central regions, they seem to have average incomes above, and in the East North Central region, an average income below, the average for the country. The one set of averages for the East South Central, West South Central, and Mountain regions places the Mountain region above, and the other two regions considerably below, the average for the country. West South Central with an average income more than 15 per cent below that for the country seems to have the lowest average of any region.

The most striking feature of the standardized averages for dentists is the relatively low average income in the East South Central, East North Central, and West North Central regions, a band of states comprising roughly the 'Middle West' and 'Deep South'. The average income of dentists practising in these regions and in any specified size of community can reasonably be set at least 10 per cent below the average income of all dentists practising in the same size of community. None of the other six regions stands out

so sharply. The Middle Atlantic, South Atlantic, Pacific, New England, and Mountain regions seem to have average incomes above the average for the country, and rank in approximately the order listed. The average for the Middle Atlantic region exceeds that for the country by 10 to 15 per cent; the averages for the other regions exceed that for the country by smaller margins.

To facilitate comparison between physicians and dentists, it is convenient to summarize the preceding results in more rigid fashion than is perhaps justified. In general the two groupings

	PHYSICIANS	DENTISTS
Regions with averages definitely above average for country	New England Middle Atlantic Mountain W. N. Central	Middle Atlantic S. Atlantic Pacific New England Mountain
Regions with averages whose relation to average for country is questionable	S. Atlantic Pacific	W. S. Central
Regions with averages definitely below average for country	E. N. Central E. S. Central W. S. Central	E. S. Central W. N. Central E. N. Central

are fairly similar: the first group has three regions common to the two professions, the last group two. But there are also certain fairly striking differences between the two groupings. West South Central seems by a fair margin to be the region in which physicians have the lowest average income; among dentists it is listed in the 'questionable' group. Dentists in this region apparently receive an average income about the same as the average for the country; physicians, an average income approximately 15 per cent below the average for the country. The second striking difference is in the position of the West North Central region. It is in the first group for physicians, in the last for dentists: i.e., physicians in this region appear to have an average income slightly above the average for all physicians; dentists, an average income about 10 per cent below the countrywide average.

Although too much reliance should not be placed on these differences,[9] they seem reasonable in view of the relative number of physicians and dentists. In 1936 there were 2.11 times as many

[9] They may merely reflect random variation or the bias in our averages for dentists arising from the restriction of our samples to American Dental Association members.

physicians as dentists in active practice in the United States. In the West South Central region the corresponding ratio was 3.18 and in the West North Central, 1.78.[10] In the West South Central region physicians are numerous relatively to dentists and their incomes are low relatively to dentists'; in the West North Central region the relation is reversed. These figures are merely suggestive and do not conclusively establish that the observed difference in relative incomes reflects this difference in the relative number of practitioners; indeed, one region, the East South Central, has an even higher ratio of physicians to dentists, 3.27, than the West South Central region; and one region, the Pacific, has an even lower ratio, 1.61, than the West North Central.

CHAPTER 6

Other Determinants of Professional Income

1 TRAINING AND ABILITY

THE KIND OF TRAINING individuals get and the ability they possess play a large role in determining their professional competence, connections, and opportunities; and, through these, their incomes. Unfortunately, data for measuring the influence of these important factors are almost nonexistent. The only information available on the influence of training and ability is from two fragmentary studies of lawyers, one for New York County, the other for Wisconsin. The New York County study

[10] See Appendix to Chapter 4, Section 3b, for a more detailed discussion of the relation between the incomes of physicians and dentists and the number of practitioners, and for the source of these figures.