Volume Title: Incomes from Independent Professional Practice, 1929-1936

Volume Author/Editor: Simon Kuznets and Milton Friedman

Volume Publisher: NBER

Volume ISBN: none

Volume URL: http://www.nber.org/books/kuzn39-1

Publication Date: 1939

Chapter Title: Incomes from Independent Professional Practice, 1929-1936

Chapter Author: Simon Kuznets, Milton Friedman

Chapter URL: http://www.nber.org/chapters/c1742

their renewal forms, together with checks, we are sending them this double issue.

Titles for the 1939 series of five *Bulletins* are still tentative but the following suggest the range of interest: Changes in Output of Finished Commodities since 1879; the Volume of Consumer Credit; Analyses of Costs in Individual Enterprises; Cyclical Fluctuations in the Prices and Production of Specific Commodities; Manufacturing Production and Productivity; Differentials in Housing Costs; Capital Formation in Post-War Business Cycles.

Commodity Flow and Capital Formation, by Simon Kuznets (8¼ by 11¾, 505 pp., $5)

Harry Scherman, in an article entitled 'One-Legged Nation' (*Saturday Evening Post,* December 31, 1938), refers to the National Bureau as "carrying on the most thorough inquiry into the nature of business cycles being done anywhere in the world". He goes on to say, referring to *Commodity Flow and Capital Formation,* that Dr. Kuznets "and his associates essayed the incredibly difficult task of itemizing every economic activity in the nation, huge and tiny; placing it in one of the several major categories outlined above; determining, by actual census or income records, how much money had been spent in it; and doing this for the seventeen years between 1919 and 1935 inclusive. This mountainous mass of economic detail they separated and laid out in order."

In an editorial on December 30, 1938 the *New York Times* states:

"Calling attention to the findings of the National Bureau of Economic Research under the direction of Dr. Simon Kuznets, Mr. Scherman points out that in the eleven-year period from 1919 to 1929 there was spent in this country for producers' durable goods and privately financed construction alone a total of $210,603,000,000, or an average of $19,000,000,000 a year. This spending was remarkably stable year by year, except in 1921 and 1922, when it fell to around $15,000,000,000 a year.

This situation has now radically changed. In the four years from 1926 to 1929 inclusive, there was spent on these capital goods (omitting the cost of servicing and repair included in the foregoing average) an average sum of $14,573,000,000, and the amount each year was also very close to this figure. But in the four years from 1932 to 1935, this amount had dropped drastically to an average of $4,650,000,000 a year. The expenditures on capital goods had fallen, in other words, to less than a third of the previous level, making a difference of almost $10,000,000,000 a year. This general situation still exists. Though the much greater spending on consumers goods has also fallen, it is in the capital goods industry that the present abnormality in American economic life is principally to be found."

The Conference on Price Research has arranged to assemble in preliminary mimeographed form 14 papers bearing on industrial price policies, presented at the Detroit meetings of the American Economic and American Statistical Associations. This arrangement, which has the approval of the editor of the *Proceedings* of the American Economic Association and the editor of the *Journal of the American Statistical Association,* is not designed to take the place of later formal publication of the papers in the usual manner. The mimeographed volume is intended for limited circulation among members of the Conference on Price Research and other interested persons.

Studies in Income and Wealth, Volume Two (342 pp., $3)

The second volume of *Studies in Income and Wealth*—papers prepared for the 1937 meetings of the American Economic and Statistical Associations and the 1938 meeting of the Conference on Research in National Income and Wealth with the discussion—has been published and is being sent to Contributing Subscribers. The contents are given below. If a copy is ordered together with Volume One ($2.50), the price for the two is $5.

Part

I On the Measurement of National Wealth, Simon Kuznets
  Discussion: R. T. Bye, Gerhard Colm, M. A. Copeland, E. M. Martin, Simon Kuznets

II The Correction of Wealth and Income Estimates for Price Changes, M. A. Copeland and E. M. Martin
  Discussion: R. T. Bye, Solomon Fabricant, Milton Friedman, M. A. Copeland, M. A. Copeland and E. M. Martin

III National Income, Savings, and Investment, Gottfried Haberler
  Discussion: M. A. Copeland, Hans Neisser, Gottfried Haberler

IV Capital Gains in Income Theory and Taxation Policy, Roy Blough and W. W. Hewett
  Discussion: M. A. Copeland, Harold Groves, Simon Kuznets, George O. May, H. C. Simons, Roy Blough and W. W. Hewett

V Problems in Estimating National Income Arising from Production by Government, G. C. Means; Lauchlin Currie and R. R. Nathan, Concurring
  Discussion: Simon Kuznets, G. C. Means; Lauchlin Currie and R. R. Nathan, concurring

VI Allocation of Benefits from Government Expenditures, R. W. Nelson and Donald Jackson

As noted in *Bulletin 66,* Volume One contained papers by M. A. Copeland, Clark Warburton, Solomon Fabricant, Simon Kuznets, Gerhard Colm, Carl Shoup, and Solomon Kuznets.

National Bureau of Economic Research

BULLETIN 72-73

FEBRUARY 5, 1939

1819 BROADWAY, NEW YORK

A NON-PROFIT MEMBERSHIP CORPORATION FOR IMPARTIAL STUDIES IN ECONOMIC AND SOCIAL SCIENCE

Incomes from Independent Professional Practice, 1929-1936

SIMON KUZNETS and MILTON FRIEDMAN

This bulletin presents some of the results of a study of income from professional practice conducted at the National Bureau since 1934. The detailed report, now in preparation, will probably be published in 1939.

The study was initiated under the direction of Simon Kuznets. By the summer of 1936 a preliminary report was completed, presenting an analysis of average levels and frequency distributions of income by size for physicians, dentists, certified public accountants, and consulting engineers, for 1929-32. Other tasks then made it impossible for Dr. Kuznets to devote the time needed to complete the study. Work was resumed in 1937 under the direction of Milton Friedman. The study was extended to cover the more recent samples for some of the professions listed above, as well as new samples for the legal profession. With the extension in scope, more intensive analysis was undertaken, particularly of factors making for interprofessional differences in average levels of income.

The text of this bulletin was prepared by Mr. Friedman, and was revised in collaboration with Dr. Kuznets. The authors wish to acknowledge the assistance of Lucille Kean, Arthur Stein, Richard Machol, and Edna R. Ehrenberg. Thanks are also due to W. C. Mitchell, A. F. Burns, and F. C. Mills for criticisms of our first draft.

We are indebted to the Department of Commerce for making the original questionnaire returns available to us and for permission to utilize them.

CONTENTS

1 *Aim and Scope of the Bulletin*

THIS bulletin presents some of the broader results of an intensive analysis of data obtained from a large number of professional practitioners concerning their incomes from independent practice for all or part of the period 1929-36. This unique body of data was collected by the Department of Commerce in connection with its studies of national income. Five professional groups are covered: physicians and surgeons, dentists, certified public accountants, lawyers, and consulting engineers.[1] The Department of Commerce has limited its analysis of these data in the main to the derivation of the average income of each profession in the country as a whole, these figures being used in preparing national income estimates.[2]

[1] These five professions include the great bulk of all independent professional practitioners.

[2] See *National Income in the United States, 1929-1932,* Senate Doc. 124 (Washington, 1934), pp. 148-50, 206-9, 245-58; *National In-*

In this bulletin we consider first the average levels of income and their changes over time. Differences among the professions in these respects are then analyzed. This is followed by an analysis of the frequency distributions of net income by size. The general characteristics of these distributions are described and one aspect—the degree of variability or inequality of incomes—is singled out for detailed discussion.

The results presented relate to the United States as a whole, to each professional group as a whole, and to *net*, as contrasted with *gross*, income. Certain other restrictions implicit in the phrase 'incomes from independent professional practice' should perhaps be mentioned explicitly. Our data cover only professional persons practising independently. Salaried employees of professional or non-professional organizations, as well as incorporated professional enterprises, are excluded. Further, even for the individuals covered, our figures relate only to income received from independent practice; income received from salaried employment, non-professional activities, property, or other sources is excluded.

Before turning to the substantive results of our analysis we shall first describe the character of the data employed, the biases to which they are subject, and the methods used to correct for these biases. Readers not interested in these details may omit the next section, but they will need to study it with the utmost care if they wish to judge or to use any of our findings.

2 *The Data and their Adjustment for Bias*

Table 1 lists the samples of data available and summarizes the salient features of each. The data cover the entire period 1929-36 only for physicians and certified public accountants. For dentists, data are available only for 1929-34; for lawyers, for 1929 and 1932-36; and for consulting engineers, for 1929-32.

The first bias to which the data are subject arises from the fact that the lists of physicians and of lawyers to whom questionnaires were sent were obtained by selecting a specified number of names from each page of the professional directories named in Table 1. Unfortunately, in both the legal and medical directories the total number of names on a page varies with the size of community. In the legal directory the average number of names per page varies from approximately 148 for cities over 1,500,000 in population to about 86 for cities under 100,000. In the medical directory the variation is much smaller and in the opposite direction: there are more names per page for the smaller communities than for the larger. Such variation obviously tends to introduce a definite bias into a sample obtained by selecting the same number of names from each page: communities for which the number of names per page is relatively large tend to be underrepresented in the sample.

An analysis of the samples revealed that such bias was indeed present: the larger communities were underrepresented in the legal samples and the smaller ones in the medical samples. The legal samples were corrected for this bias by computing the averages and frequency distributions separately for each size of community. The number of lawyers in the sample for each size of community was then adjusted on the basis of the estimated number of names per page for communities of that size. These adjusted numbers were used as weights in combining the results for the different sizes of community.[3] No correction was made, however, in the medical samples. The bias was so small and its effect on the national averages so slight that the great amount of labor necessary to correct for it seemed scarcely worth while.[4]

Another source of bias affects the legal and the accounting samples. For these professions, questionnaires were sent to practitioners selected from a list of individuals, but each individual was requested, if a member of a firm, to reply for the firm as a whole. The returns are thus on the basis of firms. But, by the procedure followed, a firm had a greater chance of being included in the sample than an individual practising alone, since it was included if *any* one of its members was included. The return, however, covers *all* the members of the firm. An overrepresentation of firm members in the final sample is thus to be expected.[5] The 1935 legal sample and the accounting samples seem to fulfill this expectation. In the 1937 legal sample, however, firm members do not seem to be overrepresented; the failure of this sample to confirm theoretical expectations ren-

(*footnote*[2] *concluded*)
come in the United States, 1929-1935 (Washington, 1936), pp. 213-6, 226-7, 290-3, 300-1; and Walter Slifer, 'Income of Independent Professional Practitioners', *Survey of Current Business*, April 1938, pp. 12-6. In addition to national averages, the first reference presents average incomes for each profession by states; the third, a brief summary analysis of the distribution of income by size.

[3] This circuitous procedure was necessitated by the absence of figures on the total number of lawyers by size of community. Had such figures been available they could have been used as weights.

[4] The effect of the bias on the national averages was tested by comparing the average net incomes obtained from the original data with averages obtained by weighting each size of community class within each region by the total number of physicians in that group. This comparison was made for 1932 on the basis of both the 1933 and the 1935 samples. The results are as follows:

	1933 sample	*1935 sample*
Average Net Income for 1932		
Unweighted	$3,430	$3,107
Weighted by size of community and region	3,353	3,104
Difference	77	3

[5] The same procedure was followed for consulting engineers. However, since a questionnaire was sent to every known consulting engineer on the list, no bias could arise from this source.

Table 1: Nature of Sample Data
Years Covered by Various Samples, Method of Selection, Number of Questionnaires Sent Out, Number Returned, Number of Usable Returns, and Number of Returns Not Usable by Reasons

						NUMBER OF QUESTIONNAIRES RETURNED[1]								
									NOT USABLE BECAUSE:					
SAMPLE	YEAR SENT OUT	YEARS FOR WHICH INFORMATION WAS OBTAINED	LIST USED FOR SAMPLING	METHOD OF SELECTING NAMES	NUMBER OF QUESTIONNAIRES SENT OUT	TOTAL	USABLE[2]	NOT USABLE	DECEASED OR RETIRED	NOT IN INDEPENDENT PRACTICE[3]	NO USABLE INFORMATION	OTHER REASONS[4]	PERCENTAGE USABLE RETURNS ARE OF TOTAL NUMBER SENT	APPROXIMATE PERCENTAGE USABLE RETURNS ARE OF UNIVERSE[5]
Physicians and Surgeons														
1	1933	1929-32	Latest issue of the Directory of the American Medical Association. The Directory is issued annually.	Specified number of names taken from each page by laying straight edge marked off at equally spaced intervals against a column of names. For samples 1 and 2 the number of names per page was the same for every page; for sample 3 it varied from state to state.	8,893	2,882	2,438	444	103	215	65	61	27.4	2.0
2	1935	1932-34			8,000[6]	1,710	1,588	122	17	66	14	25	19.8	1.3
3	1937	1929-36			9,472	1,647	1,577	70	10	9	50	1	16.6	1.2
Dentists														
1	1933	1929-32	Membership list of the American Dental Association for year in which sample was sent out.	Details of method uncertain. Presumably every n-th addressograph plate. Same proportion of names selected for every state.	5,000[6]	1,609	1,499	110	8	68	20	14	30.0	2.5
2	1935	1932-34			5,000[6]	1,202	1,122	80	11	20	6	43	22.4	1.9
Lawyers[7]														
1	1935	1932-34	Latest issue of the Martindale-Hubbell Law Directory. The Directory is issued annually.	Same as for physicians. For sample 1 the number of names per page was the same for every page; for sample 2 it varied from state to state.	6,000[6]	1,198	1,077	121	27	72	9	13	18.0[8]	1.1[9]
2	1937	1929, 1932-36			10,182	1,260	1,063	197	18	79	91	9	10.4[8]	0.9[9]
C.P.A.'s[7]														
1	1933	1929-32	Mailing list of the American Society of Certified Public Accountants for year in which sample was sent out. List included non-members as well as members.	Every 2d or 3d name. Proportion of all names selected varied for the different samples.	5,000[6]	977	679	298	21	171	19	87	13.6[8]	11.3[9]
2	1935	1932-34			7,000[6]	1,346	1,148	198	14	144	13	27	16.4[8]	14.8[9]
3	1937	1929, 1934-36			7,809	853	752	101	15	57	19	10	9.6[8]	9.4[9]
Consulting Engineers[7]														
1	1933	1929-32	Directories of American Institute of Electrical Engineers, American Institute of Mining & Metallurgical Engineers, American Society of Mechanical Engineers, American Society of Civil Engineers.	American Engineering Council checked the names of individuals recognized as consultants. Every name checked was used.	3,286	804	415	389	59	227	43	60	12.6[8]	5.5[9]

[1] Excludes questionnaires returned by post office as undeliverable.

[2] Includes all returns containing any usable information. The numbers in this column are thus somewhat greater than the numbers on which most of the results in this bulletin are based.

[3] Includes returns on which respondent indicated he was a salaried employee or 'not in public practice'. For accountants and engineers also includes returns for incorporated firms.

[4] Includes returns on which respondent indicated independent professional activity was purely incidental to other full time work, duplicate returns, i.e., returns by a member of a firm for which another partner had reported, returns from persons practising outside continental U.S., and returns omitted for several other reasons.

[5] The numbers in the universe used as the basis for these percentages were obtained by straight line interpolation or extrapolation from estimates based on a variety of sources of the number of persons in independent practice in 1930 and in 1935, 1936, or 1937.

[6] Approximate. Exact figure not known.

[7] Firm members were requested to report on questionnaire for entire firm. Hence figures on number of returns represent not the number of practitioners but the number of practitioners practising individually plus the number of firms. The number of practitioners covered by the returns would be considerably larger.

[8] In interpreting these figures it should be borne in mind that questionnaires were sent out on the basis of names of individual professional practitioners, whereas replies were requested for firms as a unit. More than one member of a firm may thus have been included among the individuals to whom questionnaires were sent, although only one return from the firm is presumably included among the usable returns. This would tend artificially to lower these percentages.

[9] Because of the situation mentioned in the preceding footnote it would be meaningless to express the number of usable returns as a percentage of the number of individual practitioners. Hence, these figures were computed by expressing the number of individuals covered by the usable returns as a percentage of the total number of individual practitioners. This should give approximately the same result as expressing the number of usable returns as a percentage of the total number of professional units (i.e., firms plus practitioners practising individually).

ders its results suspect. The earlier legal sample and all the accounting samples have been adjusted to eliminate the firm member bias. In combining the results, firms of different size have been weighted inversely to the overrepresentation theoretically to be expected.[6]

The third peculiarity of the data for which an adjustment was made characterizes only the 1937 medical and legal samples. These samples are admittedly non-random as between states; the sampling ratio was deliberately varied from state to state.[7] The averages and frequency distributions for the different states have therefore been combined by weighting.[8] For physicians the weights employed were the estimated number in active practice in each state in 1936.[9] For lawyers the weights used were the number listed for each state in the *Martindale-Hubbell Law Directory* for 1936.[10]

The last bias for which adjustment was made arises from the restriction of the dental sample to members of the American Dental Association. Previous studies—one relating to incomes in 1929 and another to incomes in 1933—suggest that the average net income of members of the American Dental Association is approximately 30 per cent greater than that of non-members.[11] The average incomes

[6] Let p represent the proportion of names on the original list included in the sample, q equal 1 minus p, and n represent the number of members of a firm. Then $1-q^n$ is the proportion of members of firms of size n one or more of whose members receives a questionnaire. Since the proportion of individuals practising alone who receive questionnaires is p, $\frac{1-q^n}{p}$ is the overrepresentation in the sample *sent out* of firms of size n, and hence of members of such firms, relative to individuals. On the assumption that the same proportion of firms and of individuals reply, the theoretical weights to be applied are $\frac{p}{1-q^n}$. As p approaches zero, i.e., as the size of the sample relative to the universe decreases, these weights approach $\frac{1}{n}$. For lawyers p is extremely small, and hence $\frac{1}{2}, \frac{1}{3}, \ldots$, were employed as the weights for two, three, . . . member firms. For accountants p was taken as .50 for the 1933 and 1935 samples, and as .40 for the 1937 sample.

[7] These data were obtained in the expectation that the results would be used in a study of income by states. For this purpose it was desired to obtain sufficient returns for each state to yield fairly reliable averages. Using the same sampling ratio for all states would have necessitated larger total samples than was feasible. Hence, a higher proportion of names was taken for the smaller states than for the larger.

[8] For the 1937 legal sample the results for each state were adjusted for the size of community bias noted above before they were combined.

[9] The 1936 *American Medical Directory* gives the total number of physicians listed for each state. These figures include, however, some physicians who are retired and not in practice. R. G. Leland (*Distribution of Physicians in the United States;* Chicago, American Medical Association, 1936, p. 17) gives by states the number of physicians in active practice, retired, and not in practice, as obtained from a special count of the 1931 directory. Since these are the latest available figures, they were used to obtain for each state the ratio of the number of physicians in active practice to the total number listed. These ratios were then applied to the total number listed in the 1936 directory to obtain estimates of the number of physicians in active practice in 1936.

The figures obtained in this way include not only independent practitioners but also salaried employees. It is doubtful, however, that this greatly affects the percentage allocation of the total among the states; and it is solely the latter, of course, that is relevant from the point of view of weighting. In any event, there are no data that could be used to estimate the proportion of salaried physicians by states. The proportion of all physicians in active practice in the United States in 1929 who were salaried employees was estimated as about 15 per cent by Maurice Leven, *The Incomes of Physicians* (University of Chicago Press, 1932), pp. 103-4.

[10] These figures were provided by Martindale-Hubbell. Although the 1936 directory lists lawyers as of 1935, it was necessary to use the figures as given, since no count by states had been made for the 1937 directory. The figures used include salaried employees of professional organizations. As in the medical sample, it is doubtful that this seriously affects the relative weight assigned to each state; and again, there is no alternative.

[11] See Maurice Leven, *The Practice of Dentistry and the Incomes of Dentists in Twenty States: 1929* (University of Chicago Press, 1932), p. 200; *California Medical Economic Survey, Formal Report on Factual Data* (San Francisco, California Medical Association, 1937), p. 73.

Leven cites 30 per cent as the difference in 1929 shown by his sample, which covered slightly over 5,000 dentists in 20 states. The averages for 1933 from the California study differ by 33.4 per cent and are based on approximately 1,600 returns. Both percentages are thus based on fairly large samples. Their closeness affords, of course, no conclusive evidence as to the reliability of either; but it does give some reason for confidence in both from our point of view, especially because of the difference in the temporal and geographical reference of the two studies.

However, neither figure is exactly relevant for our purposes. In both studies individuals were classified as members or non-members on the basis of their answers to a question requesting them to indicate the societies to which they belonged. Leven found a wide discrepancy between the membership records of the American Dental Association and the information supplied by the dentists themselves; 49 per cent of the dentists in the 20 states covered by Leven's sample were carried on the membership rolls of the Association in 1929; whereas Leven estimates that 68 per cent would have classified themselves as members if all had submitted schedules (*op. cit.*, pp. 12 and 200). The California figures suggest a similar discrepancy. The discrepancy is presumably attributable to three groups: individuals who were formerly members of the Association but had been dropped for non-payment of dues or for other reasons; individuals belonging to local or other dental societies but not to the national association; individuals who had become members so recently that their names had not been entered on the membership rolls.

Since our samples were chosen from the membership rolls of the American Dental Association, only individuals listed as members by the Association could have been included. Hence, the relevant figure for our purposes is the percentage excess of the average income of this group of members over the average income of other dentists. Call this k. Let x_m represent the average

shown by our sample may thus be expected to be too high. Since approximately 46 per cent of all dentists were members of the Dental Association when our samples were selected,[12] a difference of 30 per cent between the incomes of

(*footnote*[11] *concluded*)

income of those clearly members; let x_q represent the average income of those who classify themselves as members but are not so considered by the Association; and let x_n represent the average income of all others. The relation between k and the figure of 30 per cent cited by Leven or the figure of 33.4 per cent obtained from the California study then depends on the relation of x_q to x_m and x_n. According to Leven's figures, if x_q were equal to x_m, then k would equal 17 per cent. On the other hand, if x_q were equal to x_n, then k would equal 42 per cent. According to the California figures, these two extreme assumptions would give values of k of about 20 and 50 per cent respectively. Presumably, the correct value of k lies between the limits set by these two extreme assumptions, since the self-designated members appear to be somewhat of a mixture of the other two groups and thus might be expected to have an average income between x_m and x_n.

The figure of 30 per cent selected for k implies, on the basis of Leven's figures, that x_q is approximately 12 per cent greater than x_n and 17 per cent below x_m. On the basis of the California figures, a k of 30 per cent implies an x_q 21 per cent greater than x_n, and 13 per cent below x_m.

[12] The figure of 46 per cent is based on (1) unpublished figures supplied by the American Dental Association on the number of members in 1932 and 1934, and (2) estimates of the total number of dentists in the United States in 1932 and 1934. Figures for 1932 and 1934 were used because our samples were drawn from the membership lists for these years. The estimates of the total number of dentists are based on straight-line interpolation between 71,055, the number of dentists listed in the Census of Occupations for 1930, and 75,225, our estimate of the number of dentists in 1936. The latter estimate is based on figures relating to July 1, 1936 given by R. P. Thomas, 'Dental Survey', *Journal of the American Dental Association and the Dental Cosmos,* XXV (January 1938), 153-60. Thomas gives 80,495 as the total number of dentists for all states except New Mexico. We adjusted this figure in two ways: first, we added 100 for New Mexico; second, we subtracted 5,320 to allow for what clearly seems an overestimate for Illinois. Thomas gives 11,320 for Illinois, whereas the 1930 Census gives 5,873. Our correction assumes that 6,000 is the correct figure for Illinois.

These figures indicated that 45.5 per cent of all dentists were members in 1932 and 47.2 in 1934. The figure we use, 46.2, is an average of these two, with the 1932 and 1934 figures weighted respectively by 4 and 3, the number of years to which the corresponding samples relate.

One difficulty with these figures should be noted: they relate to all dentists, whereas we use them in connection with data for independent practitioners. This implicity assumes that the same proportion of members and non-members are independent practitioners. There seems no way to check this assumption. However, some indication of the maximum error involved is provided by the fact that if we assume that *all* members are in independent practice, and accept unpublished estimates by the American Dental Association of the total number of dentists in independent practice (these estimates seem, if anything, slightly too low) then, using the procedure outlined above, we should have estimated that 57.8 per cent of independent practitioners were members.

members and non-members would mean that the average net income of all dentists would be 87.6 per cent of the average income of members alone. In deriving the final estimates of the average incomes of dentists given in Table 4 below this figure is employed to correct for the bias resulting from the exclusion of non-members.[13]

For all the professions except consulting engineers, data are available for one or more years from more than one sample. Comparison of the distributions of the different samples by states or by region and size of community with one another, as well as with the estimated distributions of all practitioners, reveals in most cases significant differences. Fortunately, however, these differences seem almost entirely uncorrelated with either the average level of income or differences between the samples in average income.

Except for lawyers, for whom the 1937 sample is suspect on other grounds, the averages yielded by the different samples are similar and serve to confirm one another (see Table 2). There is indeed a slight tendency for the earlier samples to show higher average incomes for the overlapping years, but this should be expected. The questionnaires requested information for a period of years from a sample of names selected from a list presumed to be comprehensive for the end of the period. Such a sample might be entirely random for the end of the period, yet it would be biased for the earlier years since it would exclude those who had meanwhile left the profession. Moreover, a list that pretends to be comprehensive for a given year seldom is; it tends to cover new entrants to the profession incompletely. The combined result of these influences is to impart an upward bias to both the average income for the latest year and the trend of income over the period. And this in turn would make for the observed tendency of the earlier sample to give a higher average for an overlapping

Assuming that a smaller proportion of members than of non-members are in independent practice would of course yield a figure below 46.2 per cent; but there seems no particular numerical assumption that deserves special recognition as setting a lower limit.

[13] Footnotes 11 and 12 indicate that the two figures on which the correction factor of .876 is based cannot be determined exactly but are selected from a range of possible values. It is therefore of interest to investigate the effect on the correction factor of choosing different values for the two basic figures. This is done in the following table in which the values we actually used are underlined. The other hypothetical values are approximately the largest and smallest values that, on the basis of the analysis in the two preceding footnotes, could have been employed.

Percentage difference between incomes of members and non-members (k) taken equal to	Value of the correction factor if percentage of members is taken equal to		
	40	46.2	60
20	.900	.910	.933
30	.862	.876	.908
40	.829	.846	.886

year. We have made no adjustment in the data to correct for this bias.

Comparison of the results of our samples with other studies[14] of professional incomes gives no reason to suspect biases of any magnitude other than those already noted, but tends rather to confirm the evidence of our samples.

3 *Average Levels of Net Income in the Five Professions*

Table 2 and Chart 1 give the arithmetic average net incomes computed from the various samples for each profession. The different samples for the same profession are not distinguished on the chart, but can be easily recognized by the period each line covers.

What conclusions can we draw from these data as to the relative income status of the different professions? For three professions the evidence is quite clear: the average net income of dentists is distinctly below that of physicians, and the latter below the average for certified public accountants.[15] The relative standing of the other two professions is less clear. The average net income of consulting engineers for the four years covered by the data is almost $1,200 greater than the corresponding average for certified public accountants. However, the fall between 1929 and 1932 in the average income of the consulting engineers relative to the other professions was so great that it is difficult to infer what the results would be were data available for the whole period 1929-36. Would the fall have continued until 1933, as in the other professions, and, if so, would it have carried the net income of consulting engineers far below that of dentists? And would their net income have risen, along with the other professions, from 1933 to 1936? If so, would the rise have been as sharp relative to the other professions as the fall was steep? An affirmative answer to all these questions would probably mean that over the period as a whole the income of consulting engineers averaged somewhat more than that of certified public accountants, and hence considerably more than those of physicians and dentists. However, the relative lateness and mildness of the recovery in private construction and producers' goods industries in general, may well have resulted in a rise in the incomes of consulting engineers considerably less rapid than the fall, relative to the other professions. If this is indeed the case, then little can be deduced from our data about the relative standing of consulting engineers.

The difficulty of determining the relative income status of lawyers arises from a different source: the wide divergence between the results of the different samples. The 1935 sample suggests that lawyers are on an income level about the same as or slightly higher than physicians; the 1937 sample, on the other hand, places lawyers above even certified public accountants. For reasons given above, the later legal sample is suspect. In addition, over half of the difference between the two samples is attributable to a single extreme return included in the 1937 sample. It thus seems reasonable to conclude that the average net income of lawyers is about the same as that of physicians and, if anything, is greater, rather than less, than the latter.

On the basis of our data alone, the ranking of the various professions in order of size of net income thus appears to be: consulting engineers, certified public accountants, lawyers, physicians, and dentists. The positions assigned to consulting engineers and lawyers are the most doubtful. This ranking is based on arithmetic means, and is influenced by the relative number of high incomes reported by members of the several professions—a point that will be illustrated presently by using the decidedly different figures showing the median incomes of physicians and dentists.

4 *Temporal Changes in the Average Levels of Income*

Chart 1 suggests great similarity in the pattern of change in average income in the various professions, except for the abrupt fall in the incomes of consulting engineers. This impression is confirmed in the main by Chart 2, which shows two sets of indices of net incomes, one with 1929 and the other with 1933 as the base, obtained by chaining the results of the various samples for each profession. The indices themselves are given in Table 3. There are, indeed, differences in detail but, except for consulting engineers, the patterns of change are so similar that it is questionable wheth-

[14] These include the surveys of the incomes of physicians and dentists in 1929 by the Committee on the Costs of Medical Care; the California Medical Economic Survey, which covered the income of physicians and dentists for 1929-34; studies of the incomes of physicians in Michigan for 1929 and 1931, Wisconsin for 1930, and Utah for 1928-33; studies of the incomes of dentists in Minnesota for 1933 and 1934; and studies of the incomes of lawyers in Wisconsin for 1929 and 1932, and New York City for 1933. Detailed comparisons will be presented in our final report.

[15] The results for 1929-32 from the 1933 samples are sufficient to establish the statistical significance of the observed differences. The average difference for the four years between physicians and dentists is $656, between certified public accountants and dentists, $2,380, and between certified public accountants and physicians, $1,725. It is difficult to determine exactly the standard errors of these differences, since this requires a knowledge of the correlations between the incomes of the respondents in different years. However, we know that the standard error of the average difference cannot be greater than the largest of the standard errors of the differences for each year separately. For each pair of professions, the standard error of the difference is greatest for 1929. We may, therefore, take these as maximum estimates of the standard error of the average difference. They are approximately $180, $270, and $290 for the differences between physicians and dentists, certified public accountants and dentists, and certified public accountants and physicians, respectively. Each of the average differences is considerably more than three times its maximum standard error.

Table 2: Average Net Incomes, 1929-1936
Averages and Number of Individuals Covered for all Samples

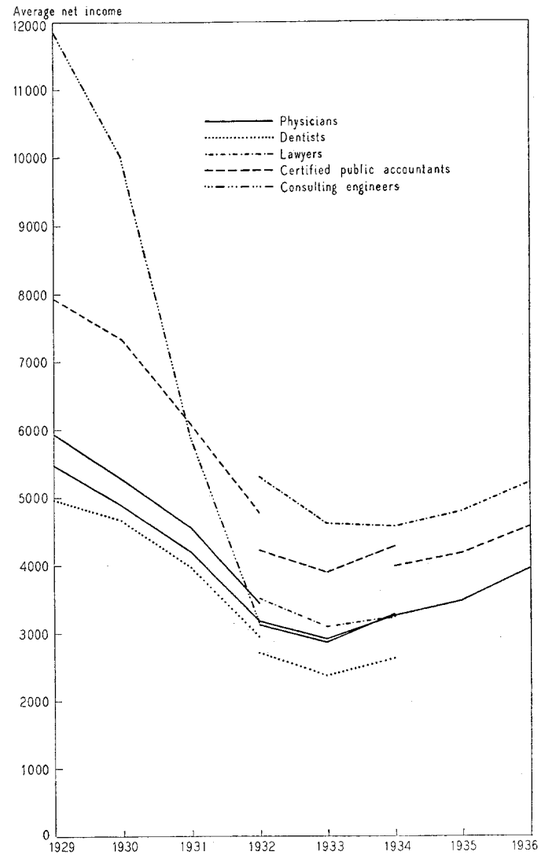
Profession	Sample	*1929*	*1930*	*1931*	*1932*	*1933*	*1934*	*1935*	*1936*
					Average Net Income[1] *(in dollars)*				
Physicians	1933	5,916	5,270	4,564	3,434				
	1935				3,107	2,867	3,287		
	1937	5,493	4,878	4,199	3,165	2,903	3,276	3,470	3,944
Dentists[2]	1933	4,969	4,664	3,986	2,943				
	1935				2,704	2,381	2,609		
Lawyers	1935				3,508	3,096	3,248		
	1937	8,118			5,303	4,604	4,567	4,795	5,202
C.P.A.'s	1933	7,926	7,313	6,071	4,773				
	1935				4,218	3,886	4,274		
	1937	5,858					3,984	4,177	4,556
Consulting Engineers	1933	11,840	10,037	5,887	3,116				
					Number of Individuals Covered[3]				
Physicians	1933	2,139	2,220	2,281	2,288				
	1935				1,392	1,452	1,497		
	1937	912	867	906	972	1,043	1,238	1,294	1,408
Dentists	1933	1,335	1,383	1,418	1,452				
	1935				1,026	1,061	1,107		
Lawyers	1935				1,271	1,334	1,379		
	1937	724			802	943	926	1,012	1,166
C.P.A.'s	1933	963	1,002	1,020	1,064				
	1935				1,412	1,487	1,519		
	1937	689					888	971	1,040
Consulting Engineers	1933	471	481	476	474				

[1] For the 1937 medical and legal samples, the figures are weighted averages of the averages for the individual states. For physicians, weights are the estimated number of physicians in active practice in each state in 1936. For lawyers, weights are the number of lawyers in each state in 1935. For the 1937 legal sample, the state averages are adjusted for the size of community bias. The averages for the 1935 legal sample are adjusted for both size of community and firm member biases. All averages for accountants are adjusted for the firm member bias.

[2] These figures are *not* adjusted for the bias due to the restriction of the dental samples to members of the American Dental Association.

[3] Figures give the actual number of *individuals covered* by the returns used, before any weighting or adjustment. These are to be distinguished from the figures given in Table 1 which relate to the total number of *returns received*.

Chart 1
AVERAGE NET INCOMES IN THE FIVE PROFESSIONS



(footnote[15] concluded)

er the minor differences ought to be attributed to anything except chance variation.[16]

The precipitous fall in the incomes of consulting engineers relative to those received in the other professions is not surprising. To a far greater extent than in the other professions the demand for the services of engineers comes from industries notoriously subject to violent cyclical fluctuations in activity—the construction and heavy industries in general. And consulting engineers are in an even more vulnerable cyclical position than engineers as a whole, since their services are required in larger part in connection with the initiation of new projects or the expansion of existing enterprises.

The demand for the services of the other professions is much broader and is not concentrated in any one group of industries or final consumers. The broad pattern of change in their average net income resembles closely that in the average income from employment of all gainfully occupied persons. The heavy solid lines in Chart 2, which represent, in index form, employees' compensation plus withdrawals

[16] Unfortunately, no method seems to be available for determining the magnitude of the differences among the patterns that could be ascribed to sampling variation.

Table 3: Indices of Average Net Incomes for the Five Professions and Indices of Employees' Compensation plus Withdrawals of Entrepreneurs per Gainfully Occupied Worker (1929 and 1933 = 100)

	1929	*1930*	*1931*	*1932*	*1933*	*1934*	*1935*	*1936*
				1929 = 100				
Physicians								
All samples[1]	100.0	89.1	77.1	58.0	53.5	61.4	65.0	73.9
1937 sample[2]	100.0	88.8	76.4	57.6	52.8	59.6	63.2	71.8
Dentists[3]	100.0	93.9	80.2	59.2	52.2	57.1		
Lawyers								
Both samples[4]	100.0			65.3	57.7	60.5	63.5	68.9
1937 sample[5]	100.0			65.3	56.7	56.3	59.1	64.1
C.P.A.'s[6]	100.0	92.3	76.6	60.2	55.4	61.0	63.9	69.9
Consulting Engineers	100.0	84.8	49.7	26.3				
Employees' compensation plus withdrawals of entrepreneurs per gainfully occupied worker[7]	100.0	90.0	75.9	59.7	58.0	64.0	68.4	76.3
				1933 = 100				
Physicians								
All samples[1]	186.8	166.4	144.1	108.4	100.0	114.6	121.4	138.0
1937 sample[2]	189.2	168.0	144.6	109.0	100.0	112.8	119.5	135.9
Dentists[3]	191.8	180.1	153.8	113.6	100.0	109.6		
Lawyers								
Both samples[4]	173.5			113.3	100.0	104.9	110.1	119.5
1937 sample[5]	176.3			115.2	100.0	99.2	104.1	113.0
C.P.A.'s[6]	180.4	166.4	138.1	108.6	100.0	110.0	115.3	125.8
Employees' compensation plus withdrawals of entrepreneurs per gainfully occupied worker[7]	172.4	155.2	130.8	103.0	100.0	110.4	117.9	131.5

[1] 1933 sample used for 1929-32; 1935 sample for 1932-34; 1937 sample for 1934-36. In deriving the index series the average net incomes for each sample in Table 2 were expressed as relatives to the income for the initial year for which the sample was to be used. The relatives for the 1935 sample were then multiplied by the 1932 relative from the 1933 sample and the relatives for the 1937 sample by the figure from the preceding step for 1934. This gave the index series on 1929 as the base. A similar procedure was used to obtain the series with 1933 as a base, as well as for each of the other professions.

[2] 1937 sample used for whole period 1929-36.

[3] 1933 sample used for 1929-32; 1935 sample used for 1932-34.

[4] 1937 sample used for 1929, 1932, and 1934-36; 1935 sample for 1932-34.

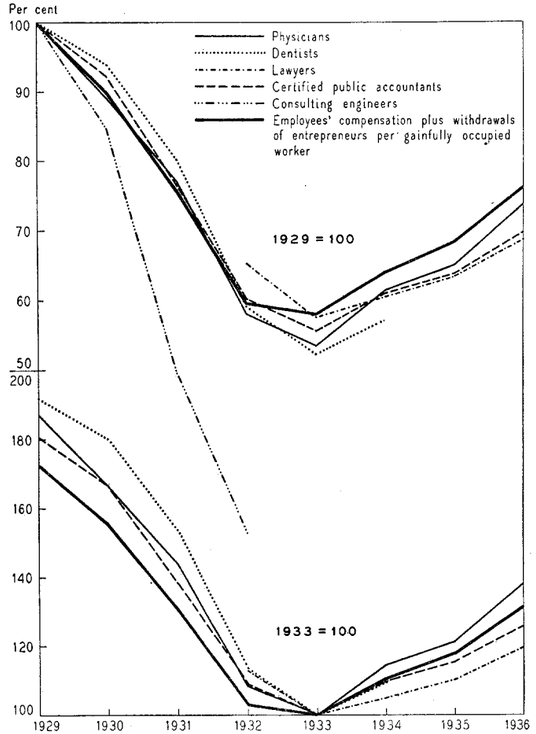
[5] 1937 sample used for 1929 and 1932-36.

[6] 1933 sample used for 1929-32; 1935 sample for 1932-34; 1937 sample for 1934-36.

[7] Estimates of employees' compensation and withdrawals of entrepreneurs for 1929-35 from Simon Kuznets, *National Income and Capital Formation, 1919-1935* (National Bureau of Economic Research, 1937), pp. 23-6. Figure for 1936 estimated on the basis of the relative change from 1935 to 1936 in total compensation of employees plus entrepreneurial withdrawals shown by the Department of Commerce in *National Income, 1929-1936* (Washington, 1937), p. 16. Total number gainfully occupied in the United States for 1929-35 supplied by Daniel Carson, National Research Project. The 1936 figure extrapolated on the basis of the relative increase from 1934 to 1935.

Chart 2

INDICES OF AVERAGE NET INCOMES FOR THE FIVE PROFESSIONS AND INDICES OF EMPLOYEES' COMPENSATION PLUS WITHDRAWALS OF ENTREPRENEURS PER GAINFULLY OCCUPIED WORKER



of entrepreneurs[17] per gainfully occupied worker for the nation as a whole, reveal a pattern of change very similar to that shown by the four professions. Were it not for the milder fall from 1932 to 1933 in the average income from employment of gainfully occupied persons, the heavy solid lines would pass through the center of the cluster of lines for the four professions and would give the impression of being averages of them.

From the indices expressed on a 1929 base, one might be led to conclude that the minor differences among the professions are greater during the recovery from 1933 to 1936 than during the preceding downswing. However, the indices expressed on a 1933 base indicate that this conclusion is not valid but is merely a result of the general tendency of relatives on a fixed base to diverge. Thus there is little reason for concluding that the behavior of average professional incomes was any more varied during the rising phase of the cycle than during the declining phase.

[17] Simon Kuznets, *National Income and Capital Formation 1919-1935* (National Bureau of Economic Research, 1937), pp. 23-6.

5 *Factors Making for Differences in Average Net Incomes, with Special Reference to Dentists and Physicians*

We may go somewhat farther in assessing the quantitative magnitude of differences in the average levels of income in the case of physicians, certified public accountants, and dentists—the three professions for which data are available for the longest continuous periods and for which the different samples give most nearly identical results. Table 4 gives estimates of the average net income in each profession for the period our data cover, as well as the absolute and percentage differences between the averages for each pair of professions. These estimates were obtained by combining the different samples for each profession into a single series[18] and correcting the figures for dentists for the bias in the average level of income arising from the restriction of the samples to members of the American Dental Association.

According to these estimates, the average net income during 1929-34 was about $5,300 for certified public accountants, $4,100 for physicians, and $3,100 for dentists. If the period 1929-36 is examined, the averages for certified public accountants and physicians are lowered to about $5,200 and $4,000 respectively. On the average, the net income of physicians exceeded that of dentists by approximately 32 per cent; certified public accountants enjoyed a net income about 72 per cent greater than dentists and 30 per cent greater than physicians.

These differences among the professions do not appear, on the basis of our data, to be temporary aberrations. They have persisted over the whole period to which our data relate and the relative differences have shown no consistent tendency to diminish. The percentage difference between certified public accountants and physicians increased somewhat during the downswing from 1929 to 1933 and then decreased from 1933 to 1936; i.e., the average income of physicians fell relatively more than that of certified public accountants during the downswing but rose more during the upswing. The average income of dentists seems to have declined relative to incomes in the other two professions from 1929 to 1934.

What factors can be adduced to explain these seemingly persistent differences in remuneration? This question may be approached most conveniently by attempting to determine

[18] In combining the samples we resorted to averaging the results of the different samples for 1932. We do not attribute any inherent logical merit to this procedure. For reasons given above we suspect that the 1932 figures from the earlier samples have an upward bias and from the later samples a downward bias, and hence that the best estimate of the correct figure is between them. Averaging seemed the least objectionable and the simplest objective procedure for selecting such a figure. Moreover, the differences between the several samples are so slight except possibly between the first and the two later accountancy samples, that alternative procedures applied consistently to all professions would have yielded results differing but slightly from those in Table 4.

whether these relative levels of return are 'equilibrium' levels, in the sense that they are the relative returns that would tend to result from free and moderately rational choice of profession by prospective entrants.

From this point of view it is clear that we do not have enough information about accountancy, since our data relate to but a small fraction of the relevant occupational group. Independent certified public accountants numbered in 1930 about 10,000 in a total of 15,000 certified public accountants and 192,000 accountants and auditors.[19] An individual, in selecting a profession, is likely to contrast accountancy, rather than certified public accountancy, with other pursuits. Moreover, even if he does set certified public accountancy as his goal, he must count on being engaged in accountancy for some years before becoming certified. In addition, he seldom can decide in advance whether he will practise independently or as a salaried employee. The formal training required is essentially the same. The opportunities that arise after completion of training are likely to determine his choice. Thus, he is apt to consider the profession as a whole and not restrict his attention to either the salaried or the independent group. These considerations would be of little importance were the incomes of independent certified public accountants representative of the incomes of all accountants. But this is not the case. Certified public accountants are a limited and select group; their training and skill are of superior quality and they perform the more difficult and complicated tasks. And independent certified public accountants are a select group within this select group, who have become independent in the main because they thereby could exploit more effectively their training and skill. The average income of this select group might be expected to be considerably above the average income of other accountants.[20]

These difficulties are present to a minor extent with dentists and physicians, and are of virtually no importance for a comparison between the two. The proportion of all practitioners in salaried employment is small, probably well under 20 per cent, and is about the same for both professions. Their inclusion would thus affect the average income of either group but slightly and the difference between the averages even less. In addition, our data cover all types of dentists and physicians—general practitioners as well as specialists—and both professions are sharply differentiated from other pursuits. It would, of course, be possible to consider physicians and dentists as part of the broader 'curative' occupational group including in addition, osteopaths, chiropractors, anaesthetists, nurses, pharmacists, etc. However, the distinction between physicians and dentists and the rest of this group in terms of training, functions, etc., is so sharp that this procedure seems unreasonable.

[19] Accountants who are not certified are almost everywhere permitted to practise independently, although the proportion who do so is very much smaller than the corresponding proportion of certified accountants.

[20] Similar considerations apply to the incomes of consulting engineers, who in 1930 numbered approximately 10,000 among 226,000 engineers.

Table 4: Final Estimates of Average Net Incomes
Physicians and Certified Public Accountants, 1929-1936; Dentists,[1] 1929-1934

	1929	*1930*	*1931*	*1932*	*1933*	*1934*	*1935*	*1936*	*Average 1929-34*	*Average 1929-36*
Average Net Income										
Certified Public Accountants[2]	7,154	6,601	5,480	4,308	3,968	4,364	4,573	4,992	5,312	5,180
Physicians[3]	5,573	4,965	4,300	3,235	2,985	3,422	3,625	4,120	4,080	4,028
Dentists[4]	4,176	3,920	3,350	2,473	2,178	2,387			3,081	
Absolute difference in average net income between										
C.P.A.'s and physicians	1,581	1,636	1,180	1,073	983	942	948	872	1,232	1,152
C.P.A.'s and dentists	2,978	2,681	2,130	1,835	1,790	1,977			2,231	
Physicians and dentists	1,397	1,045	950	762	807	1,035			999	
Percentage excess of										
C.P.A.'s over physicians	28.4	33.0	27.4	33.2	32.9	27.5	26.2	21.2	30.2[5]	28.6[5]
C.P.A.'s over dentists	71.3	68.4	63.6	74.2	82.2	82.8			72.4[5]	
Physicians over dentists	33.5	26.7	28.4	30.8	37.1	43.4			32.4[5]	

[1] Figures for dentists corrected to allow for exclusion of individuals not members of the American Dental Association.

[2] These figures were obtained from those in Table 2 as follows: the 1937 sample was extrapolated back to 1932 by multiplying the 1934 average net income figure by the ratio obtained from the 1935 sample of the 1932 to the 1934 average income. The resultant figure and the averages for 1932 from the other two samples were then averaged and the result used as the final figure for 1932. This figure was then extrapolated back to 1929 on the basis of the 1933 sample, forward to 1934 on the basis of the 1935 sample, and from 1934 to 1936 on the basis of the 1937 sample. In each case the extrapolation was performed by multiplying by the ratio of the incomes for the two relevant years.

[3] These figures were obtained by a procedure similar to that employed for accountants. The three figures available for 1932 were averaged and the result taken as the final figure for that year. This figure was then extrapolated back to 1929 on the basis of the 1933 sample, forward to 1934 on the basis of the 1935 sample, and from 1934 to 1936 on the basis of the 1937 sample.

[4] These figures were obtained by averaging the two available figures in Table 2 for 1932, extrapolating backward on the basis of the 1933 sample and forward on the basis of the 1935 sample. The resultant figures were then multiplied by .876 to correct for the restriction of the samples to members of the American Dental Association. This correction factor assumes that the average income of members exceeds that of non-members by 30 per cent and that 46.2 per cent of the dentists are members.

[5] These percentages are based on the average incomes for the whole period. They thus represent weighted averages of the percentages for the separate years, the weights being the average income for the profession on which the percentages are based.

Medicine and dentistry are, of course, related professions requiring similar abilities and training. A sizable proportion of the persons choosing one of the professions might thus be expected to have considered the other as an alternative. Moreover, at least in the early stages, the training required for the two professions is virtually identical.[21] The final choice between the two can thus be postponed longer than in professions differing more widely in the preliminary training required.

With freedom of entry into both professions one might thus expect a fairly close adjustment of the level of return between the two professions. What factors then would make this equilibrium relationship differ from equality of average incomes? The rest of this section is devoted to an attempt to answer this question, and the related one of whether these factors suffice to explain the observed difference in average incomes. Though phrased in terms of medicine and dentistry, the analysis is of fairly general applicability. The factors considered are of importance not only for these professions but for others, as well as for many non-professional pursuits. The specific substantive conclusions as to the influence of these factors are obviously restricted to medicine and dentistry; but the methods of reaching these conclusions are of general relevance.

We warn the reader in advance that we shall make a far more elaborate comparison of the prospective pecuniary attractiveness of the two professions than we suppose any young aspirant hesitating between medicine and dentistry actually makes in practice.[22] Our elaboration is designed to bring out clearly the numerous considerations that are logically pertinent to the choice. Presumably these considerations are weighed, though vaguely and roughly instead of clearly and precisely, by a number of men sufficient to influence appreciably the relative supply of medical and dental services later offered to the public. The role actually played in the choice of a profession by these considerations can be discussed most intelligibly if we set them forth with the care that a pedantic accountant with a taste for research might use in advising his son whether to study medicine or dentistry. This father would supplement his calculations by the admission that they rest upon data of doubtful accuracy as to current conditions, and certainly involve projections into the future that may prove to be wide of the mark. He might add that what holds true on the average for a considerable group of men will not apply strictly to most of the individuals in the group.

a *Effect of differences in length of training*

One of the major factors making for a difference in average income is the difference in the period of training for the two professions. Typically, individuals beginning to practise medicine have had from eight to ten years of training after high school, and individuals beginning to practise dentistry, from five to seven.[23] The period of training is thus about nine years for medicine and six for dentistry. The three additional years of training for medicine entail special costs for tuition fees, professional equipment, books, and the like. Moreover, if we may assume an equal expected active life for physicians and dentists, the additional years of training shorten the period during which the practitioner can expect to earn an income. More important than either of these, however, is the cost arising from the postponement of income. An individual comparing the two professions must take into account the fact that if he chooses medicine each annual installment of income will be received three years later than if he chooses dentistry. At an interest rate of 4 per cent per annum each installment of income from medicine would have to be approximately 12.5 per cent higher than the corresponding installment from dentistry in order that the 'present value' of the two installments, at the time of making the decision, be equal.[24] It is somewhat more difficult to estimate the influence of the extra special costs and the shorter working life attached to the choice of medicine. However, the exceedingly rough figures we have assembled suggest that, to take these into account, the figure of 12.5 per cent just cited would have to be raised to about 17 per cent; i.e., that to make the two professions equally attractive *financially* (or actuarially) to the prospective practitioner, the expected annual return from medicine would have to exceed that from dentistry by 17 per cent.

The relevance of such a figure in an analysis of actual differences in incomes may be questioned. As we have suggested, individuals choosing a profession have neither the knowledge of costs and returns nor the mathematical training needed to arrive at such an estimate; moreover, even possessing this knowledge, few would take the trouble to make an exact numerical calculation. The computation and presentation of a figure with the aura of exactness possessed

[21] The period of training after high school required before admittance to the professional school is ordinarily shorter for dentistry than for medicine. However, the pre-dental curriculum, as far as it goes, is almost identical with the corresponding portion of the pre-medical curriculum.

[22] See especially section 1 of the Appendix.

[23] The periods of training cited represent current practice, rather than legal requirements. The latter are usually somewhat lower.

[24] By 'corresponding' installments we mean installments received the same number of years after *beginning practice*. There will obviously be a difference of three years in the dates at which these installments would be received. The figure 12.5 is equal to $100\,[(1.04)^3 - 1]$. It thus assumes annual compounding.

by '17 per cent' may thus seem an attempt to force into a rigid and precise mold a process that is essentially vague and unprecise. While few if any individuals go through the reasoning or calculation underlying our estimate, many individuals do attempt in reaching their decision to take into account in some way the differential costs attached to the choice of one profession rather than another. Implicitly or explicitly, they attempt to estimate the difference in incomes that will compensate for these costs. It seems reasonable to suppose that they are as likely to overestimate as to underestimate this difference; and, on the whole, we may expect the estimates to cluster about the correct value. And 17 per cent is our best (though admittedly rough) *estimate* of this correct value. It thus summarizes the objective facts that impinge more or less strongly and more or less accurately on individual evaluations of costs and returns. It is of little value in explaining the behavior of any single individual; it may be of great value in explaining the behavior of the group of prospective practitioners as a whole.

A detailed explanation of the way the figure of 17 per cent was derived and of the assumptions underlying it is given in section 1 of the Appendix.

b *Effect of variability of incomes*

So far we have considered only what might be called the 'actuarial' aspect of the choice of a profession. Consequently, we have been concerned solely with the arithmetic average incomes of physicians and dentists, since these are the figures that are required for an analysis of 'expected' returns. Presumably, however, individuals' decisions as to choice of profession are affected not only by the expected arithmetic mean income but also by the variability of incomes, i.e., by the likelihood of receiving incomes that deviate more or less from the average.

As we shall see below, physicians' incomes show very much greater diversity, in both absolute and relative terms, than dentists'. An individual is more likely to receive an exceedingly poor income in medicine than in dentistry; but he also is more likely to receive an exceedingly high income in medicine than in dentistry. The median income in medicine—the income that divides into two equal groups an array of practitioners by size of income—and the median income in dentistry are considerably closer than the two mean incomes. Indeed, Table 5 shows that the median incomes computed for our original samples are about equal for the two professions: for physicians the median income ranges from $4,223 in 1929 to $2,137 in 1933, and for dentists, from $4,080 in 1929 to $2,080 in 1933. However, the figures for dentists in this table are not corrected for the restriction of our sample to members of the American Dental Association. No data are available on the basis of which such a correction could be made in the medians; but it is clear that the median income for the dental profession as a whole is below that for members of the American Dental Association, and hence, that correction for the bias in our samples would yield a median income in dentistry below that in medicine—though how much below we are not in a position to say.[25] Similarly, the modal incomes in the two professions—the most frequent incomes—are closer than the mean incomes and indeed may be lower in medicine than in dentistry, though again, the bias in our dental samples makes any exact statement impossible.

Whether a wide range of incomes acts as an attraction or a deterrent is not clear. Does the gambling instinct outweigh the urge for security and hence lead a larger proportion of individuals to choose medicine than would do so if the diversity of incomes were the same? Or is the reverse true? There is no empirical basis for either conclusion; and on subjects such as these, *a priori* speculation is peculiarly likely to be subject to error. Nevertheless, we may hazard the guess that the greater diversity of incomes acts as an attraction. The urge for security among the parents of the prospective practitioners is likely to be more than counterbalanced by their naturally overconfident evaluation of their progeny's ability and chance of success; and there would probably be little disagreement that among the prospective practitioners themselves the gambling instinct is incomparably the stronger.[26] If these observations are correct, then,

[25] It should be recalled that we lowered the *arithmetic mean* income of dentists by 12.4 per cent to correct for the bias due to the restriction of the samples to members of the American Dental Association. Whether the correction that should be applied to the medians is greater or less than this there seems no way of knowing.

[26] "There are many people of a sober steady-going temper, who like to know what is before them, and who would far rather have an appointment which offered a certain income of say £400 a year than one which was not unlikely to yield £600, but had an equal chance of affording only £200. Uncertainty, therefore, which does not appeal to great ambitions and lofty aspirations, has special attractions for very few; while it acts as a deterrent to many of those who are making their choice of a career. And as a rule the certainty of a moderate success attracts more than an expectation of an uncertain success that has an equal actuarial value.

"But on the other hand, if an occupation offers a few extremely high prizes, its attractiveness is increased out of all proportion to their aggregate value. For this there are two reasons. The first is that young men of an adventurous disposition are more attracted by the prospects of a great success than they are deterred by the fear of failure; and the second is that the social rank of an occupation depends more on the highest dignity and the best position which can be attained through it than the average good fortune of those engaged in it." Alfred Marshall, *Principles of Economics* (8th ed., London, 1929), pp. 554-5.

That the present instance is of the second rather than the first of the types considered by Marshall is fairly clear, both from the wide dispersion and the extreme skewness of the frequency distribution of incomes in medicine, and from the existence even in our samples of a few incomes in medicine far greater than any reported in dentistry.

if *all other things were the same,* a difference in expected average income just sufficient to compensate for the extra financial costs incident to the choice of medicine, combined with a greater dispersion of incomes in medicine, would mean that more individuals would choose medicine than would choose dentistry as a career.

c *Non-pecuniary factors affecting the choice of a profession*

But what are these 'other things' assumed the same in the preceding sentence? And what in fact is their effect on the rates of return that would be considered 'equivalent' by prospective practitioners? In the main, they include those non-pecuniary advantages and disadvantages which must be valued and added to or subtracted from expected earnings in order to obtain what Marshall has designated an occupation's 'net advantages'.[27] The decisions of prospective entrants to a profession are affected not only by expected pecuniary returns but also by such subjective and intangible factors as the prestige value attached to the profession, the opportunity it offers for rendering service and for making 'social contacts', the conditions under which professional work is performed, and the personal predilections for one type of work rather than another. Here again, empirical analysis of the influence of these factors seems out of the question. But there would probably be little disagreement with the conclusion that, with pecuniary returns equal, the 'net advantages' are very definitely on the side of medicine. Medicine, indeed, involves less regular and possibly longer hours, less personal freedom, the inconvenience of 'home' calls, and consequently, greater physical and mental strain. Another factor that may be important is that the individual choosing medicine must ordinarily reckon on postponing both marriage and the attainment of financial independence longer than if he entered almost any other profession. On the other hand, medicine is held in higher general esteem than dentistry, offers greater opportunity to render service, partakes more of a 'professional' and 'scientific' character as opposed to a 'commercial' one, and involves work that most people would probably consider more 'interesting'.

It thus seems clear that although a 17 per cent excess of the average income of physicians over that of dentists might make the two professions equally attractive financially, medicine would be the more attractive if non-pecuniary considerations were taken into account as well; i.e., with a difference of 17 per cent, the number of persons planning to enter one or the other profession who would choose medicine would be larger—and we suspect, very much larger—than the number choosing dentistry.

d *Influence of demand*

It does *not* follow from these conclusions, though offhand it might seem to, that the 'equilibrium' difference between the average incomes in the two professions is necessarily less than 17 per cent. At this stage of our argument, it would be valid to draw such an inference only if *all* individuals evaluated identically the pecuniary and non-pecuniary factors. But individuals do differ in their evaluation of the advantages and disadvantages of a particular profession. Some would prefer dentistry to medicine even though medicine promised a much higher income, although, presumably, the number of such individuals would be the smaller the larger the expected excess of the income from medicine. Conversely, some individuals would prefer medicine even though they expected it to yield a much smaller income than dentistry, but again, the number of such individuals would presumably decrease if the relative financial advantage of dentistry increased. All we have argued so far is that, if the two professions were considered financially equivalent, the number of individuals who preferred medicine would be greater than the number who preferred dentistry; we have not argued—or attempted to argue—that *all* individuals would prefer medicine to dentistry.

The actual difference between the 'equilibrium' levels of return thus depends also on the relative demands for the services of the two professions. The greater the demand for medical services relatively to that for dental services, the greater the ratio of the number of physicians to the number of dentists that is consistent with any specified ratio of their incomes; or, alternatively, the greater the ratio between their incomes that is consistent with a specified ratio between the number of physicians and dentists. Under given conditions of demand, the 'equilibrium' difference is that difference which induces new entrants to choose medicine and dentistry in just the proportions required to maintain the existing ratio of physicians to dentists, i.e., to maintain the existing ratio of incomes. To any given difference in average incomes, say 17 per cent, there corresponds (1) a definite ratio of the total number of physicians to the total number of dentists; (2) a definite ratio of the number of persons seeking to enter medicine to the number seeking to enter dentistry. The difference of 17 per cent is the 'equilibrium' difference if the second of these ratios is just large enough to maintain the first, i.e., speaking roughly, if the second ratio is about equal to the first.[28] The 'equilibrium' difference is greater than 17 per cent if the second ratio is smaller than the first; it is less than 17 per cent if the second ratio is greater than the first.[29]

[27] *Ibid.,* pp. 73 and 557.

[28] The qualification 'speaking roughly' is necessary because differences in age distribution, ability required, etc., may mean that the ratio of applicants would have to differ somewhat from the ratio of practitioners to keep the latter constant.

[29] This theoretical statement is to some extent inexact, since, under given conditions of demand, it is entirely possible for more than one ratio of numbers of practitioners to be consistent with a fixed ratio of incomes, if the number of practitioners in the two professions combined varies. Exactness would have required phras-

At present, average incomes differ by about 32 per cent, and there are slightly over twice as many physicians as dentists. To make the difference in average incomes fall to 17 per cent, the number of physicians would have to increase relatively to the number of dentists. It is, of course, impossible to say exactly how great an increase would be required, but it may be hazarded that, at most, there would have to be about three times as many physicians as dentists.[30] Hence about 75 per cent of all entrants to both professions would have to choose a medical career promising a difference of 17 per cent in average income in order that such a difference, once achieved, might be maintained, i.e., in order that 17 per cent be the 'equilibrium' difference. On the basis of our preceding analysis, the choice of medicine by an even greater proportion of new entrants seems not unreasonable. We are thus led to the highly tentative conclusion that the equilibrium rate of return in medicine would not exceed that in dentistry by more than about 17 per cent. This conclusion is based on many questionable figures and uncertain assumptions; but we shall see that it is independently supported by certain critically important and tolerably reliable figures cited below in section 5f on *Restriction of entry*.

e *Comparison of the difference in individual expected income with the observed difference in average income*

The observed difference between the average incomes of physicians and of dentists for the period 1929-34 is slightly over 32 per cent; almost twice as great as 17 per cent, the figure we consider an upper estimate of the 'equilibrium' difference. Before attaching any great importance to this divergence, however, two questions must be answered: First, is the comparison statistically valid? Second, can the divergence between the 'equilibrium' and the observed difference be regarded as a transitional phenomenon?

The 'equilibrium' difference is essentially an estimate of the difference between the incomes that an *individual* might expect to receive in the two professions. Can this validly be compared with the difference between the *average* professional income of *all* dentists and *all* physicians? The difficulty is that physicians and dentists differ with respect to their distribution both by number of years in practice and by location—two factors that have a very important bearing on income. An observed difference of 17 per cent between the average incomes of physicians and of dentists in practice the same number of years and living in the same community is not necessarily inconsistent with a difference of 32 per cent between the averages for the country as a whole. Yet it is the former that is relevant to an individual making a choice between the two professions; his concern is with the difference in the incomes that *he* can expect to receive throughout his working life.

In fact, however, the available data suggest that correction of the average incomes of physicians and dentists for the differences between their distribution by number of years in practice and by location would widen the gap between the averages rather than narrow it; and would thus make the observed difference even greater relative to the 'equilibrium' difference than is suggested by the figures we cite.

Estimates for 1929 of the average net income of dentists in general practice by year of graduation from dental school, as well as of the percentage distribution of physicians by number of years in practice, are given by Leven.[31] The average income of the dentists is $4,790. Assuming the distribution by years in practice to be the same as for physicians, i.e., weighting the average income of the dentists for each 'years-in-practice' group by the percentage of physicians in that group, gives an average of $4,764, a figure slightly *lower* than the original average. Data obtained for 1933 in the California Medical Economic Survey confirm these results.[32] The average income of the physicians covered by this survey is $3,567, of the dentists $2,769. The average income of physicians, weighted by the distribution by years in practice of dentists, is $3,705. The average income of dentists, weighted by the distribution by years in practice of physicians, is $2,635. Thus, whether we assume dentists distributed by years in practice in the same way as physicians, or the reverse, elimination of the effect of differences in distribution by years in practice widens the difference between the two professions.

Evidence on the influence of geographic location and size of community is provided by our own data. If we omit the 29 returns for physicians and the 12 returns for dentists for which size of community or region is unknown, the average income for 1934 shown by the 1935 samples is $3,315 for physicians and $2,616 for dentists. Weighting the averages for each profession in each community size group within each region by the number of returns for the other profession in the corresponding group gives averages of $3,456 for physicians and $2,595 for dentists. Both comparisons suggest that correcting for differences in location would widen the divergence between the average incomes.

The divergence between the 'equilibrium' and observed differences thus seems statistically valid. The question still remains, however, whether this divergence may not be a transitional phenomenon. Because of the long period of training required for both professions, adjustment of the number of practitioners to changes in conditions of demand or cost is necessarily a slow process. The great majority of the individuals now practising medicine and dentistry were affected in their choice of profession by the conditions prevailing ten or more years ago. The excess of the observed over the 'equilibrium' difference might thus be interpreted as reflecting a rise in the demand for medical services relative to the demand for dental services, or a decline in the extra costs attached to the choice of medicine in preference to dentistry and, hence, in the 'equilibrium' difference. And, so this interpretation would continue, sufficient time has not yet elapsed for complete adjustment to the new conditions. However, this interpretation seems untenable. The figures underlying our estimate of the 'equilibrium' difference relate not solely to the last year or two, but to a longer period, dating back at least to 1929. The major part of the estimated difference would have been little affected had the estimate been made for, say, the middle or late 'twenties. Any considerable change in the excess costs attached to becoming a physician must thus have taken place at the very latest about ten years ago.[33] Sufficient time has thus elapsed for the process of adjustment to have started, although not necessarily to have been completed. But, if the adjustment has started, then the gap between incomes in medicine and dentistry should have narrowed over the period covered by our data, whereas it has, if anything, widened. Free and rational choice of profession by prospective entrants may possibly explain the achievement of a 32 per cent difference in incomes; it cannot explain the maintenance of such a difference.

f *Restriction of entry*

If our reasoning is correct the excess of the actual difference in average incomes over the 'equilibrium' difference should result in a flood of persons seeking to enter medicine in preference to dentistry. And this, indeed, is what has happened. During the period covered by our data between 12,000 and 13,000 individuals applied annually for admission to American medical schools, while apparently less than 3,000 sought admittance to dental schools.[34] Thus over four times as many persons were seeking to become physicians as dentists, although the total number of physicians is only slightly over twice as great as the number of dentists. Moreover, the number seeking to enter medicine would doubtless have been even greater, were not potential entrants aware of restriction of entry into medicine.

Were ease of entry the same for the two professions we should, as already noted, expect a narrowing of the gap between their incomes as a result of the relatively large number of individuals seeking to enter medicine. In fact, however, ease of entry is not the same. Whereas over four times as many *sought* to enter medicine as dentistry, the proportion who were admitted to medical schools and were therefore able to undertake training for the profession was much smaller than the corresponding proportion in dentistry. In recent years between 40 and 50 per cent of the applicants for admission to American medical schools have been rejected.[35] The corresponding percentages are not available for dentistry, but they are undoubtedly very much

(*footnote*[29] *concluded*)
ing the discussion in terms of absolute incomes and of absolute numbers of practitioners and of new entrants into each profession. The conclusions would in no wise have been altered, but the exposition would have been more complicated. In section 2 of the Appendix the theoretical nature of the concepts used is discussed in greater detail.

[30] The ratio of 3 to 1 as a maximum estimate is suggested by the following considerations:

1) If the ratio of the total amount of money spent on medicine to the total spent on dentistry were to remain constant, a rise in the ratio of the number of physicians to the number of dentists from the present figure of 2.1 to 2.4 would suffice to reduce the ratio of average incomes from 1.32 to 1.17.

2) The reduction of the ratio of incomes from 1.32 to 1.17 as a result of a rise in the ratio of the numbers of practitioners from 2.1 to 3.0 would imply a 27 per cent increase in the ratio of the total amount spent on medicine to the total spent on dentistry.

[31] *The Practice of Dentistry,* p. 125; *The Incomes of Physicians,* p. 114. The figures for dentists' incomes are based on a sample of 4,189 dentists in 20 states. This total includes, however, 311 dentists whose incomes were used only in obtaining the average for the sample as a whole because the year of graduation was either unknown or prior to 1890. The average we use excludes these 311 dentists. The distribution of physicians by number of years in practice is based on "a random sample of 11,766 physicians in the 1929 *American Medical Directory* taken proportionately from cities of different sizes".

[32] *California Medical Economic Survey, op. cit.,* pp. 80 and 88. This survey provides data for 2,686 physicians and 1,595 dentists on average net income in 1933 by the number of years since completion of training as well as the corresponding frequency distributions of the samples. These figures, as well as those cited in the text, exclude 51 physicians and 20 dentists whose length of practice was unknown.

[33] So far as conditions of demand are concerned, it seems very likely that demand for dental services has risen relatively to demand for medical services, rather than the reverse. And, other things the same, this would have resulted in an observed difference *less* than the 'equilibrium' difference.

[34] These figures represent individuals, not applications. They are corrected for the filing of several applications by the same individual; see articles by F. C. Zapffe in *Journal of the Association of American Medical Colleges,* March 1933, July 1937, May 1938; W. J. Gies, 'Is the Influx of New Graduates Commensurate with the Demand for Dental Service, or Should the Educational Requirements be Altered?', *Journal of the American Dental Association,* XVIII (April 1931), 589-99. The figure for dental schools is very much less reliable than the figures for medical schools. It represents a rough maximum estimate based on scattered materials relating mainly to admissions.

[35] See Zapffe, *loc. cit.* The exact percentages rejected are: 1929, 48.5; 1932, 40.1; 1933, 37.8; 1934, 41.9; 1935, 45.8; 1936, 47.0; 1937, 47.5.

These figures overstate, of course, the proportion of those who apply who are eventually refused, since individuals who are refused in one year may apply again. On the basis of the available figures, it can be estimated that approximately 33 per cent of all who seek admittance to medical schools are never admitted. This estimate is based on figures given by B. D. Meyers, 'Report on Applicants for Matriculation in Schools of Medicine of the United States and Canada', *Journal of the Association of American Medical Colleges,* March 1930.

smaller. The total number of graduates of medical schools in the United States during the period our data cover averaged about 5,000 as compared with about 2,000 for American dental schools, and the total of new admissions to the practice of medicine, including graduates of foreign schools, averaged about 5,500.[36] The ratio of the numbers of new entrants to the two professions has thus been much less than the ratio of the numbers seeking to enter, although seemingly not so low as the ratio of the total numbers in the professions.[37] As a result, the gap between the incomes of physicians and dentists has shown no tendency to narrow; if anything, it has widened somewhat.

This difference between ease of entry into medicine and dentistry is open to three interpretations. One is that it reflects a factor that was omitted from the analysis on which our estimate of the 'equilibrium' difference was based, namely, the relative supply of 'innate abilities' needed for the practice of the two professions. Thus, the greater proportion of rejections among applicants for admittance to medical schools might be interpreted as a result of a greater scarcity of the 'innate abilities' needed for the practice of medicine than of those needed for the practice of dentistry. Two considerations—one *a priori,* the other, empirical—militate against this interpretation, although it cannot be denied that it may play some role. In the first place, as we have suggested above, much the same type of ability would seem to be needed for both professions. In the second place, the particular students admitted are presumably the ones whom the medical schools deem the ablest of the applicants; yet, the proportion of acceptances of applicants who had previously been refused is only slightly lower than the proportion of acceptances of new applicants—that is, those applying for the first time. The percentage of new applicants accepted in 1927, 1928, and 1929 can be estimated as 59.4, 56.4, and 52.3, respectively, and the percentage of applicants previously refused who were accepted as 56.0, 54.4, and 48.1.[38] The time elapsing between the first refusal and subsequent application may, indeed, have been spent in securing additional training.[38a] Yet, in law, where the situation with respect to securing additional training is similar, the percentage of new applicants passing the bar has in recent years been about 55 per cent as compared with 38 per cent for applicants repeating the examination.[39] It thus seems clear that the supply of innate ability is sufficient to furnish each year more medical students than are admitted to medical schools.

A second possible explanation of the difference in ease of entry is that it reflects a scarcity of training facilities, so that the admission of more students would crowd the existing facilities and impair the standards of training. That the difference in ease of entry has persisted over a rather long period does not of itself undermine this explanation. Facilities may have been expanded in response to the demand for medical training, but standards of education and the quantity of equipment required for each student may have risen equally rapidly. To pass a reasoned and sound judgment on this explanation would require knowledge far more intimate than we possess of physical and human facilities, of the possibility of expanding them, of the equipment needed to provide adequate training, of changes in the nature of training deemed adequate by qualified judges, etc.

The third possible explanation of the difference in ease of entry is that it reflects a deliberate policy of restricting the number of entrants in order to keep down the total number of physicians, that is, to prevent so-called 'overcrowding' of the profession.[40]

[36] For the medical figures see annual articles in the *Journal of the American Medical Association* on 'Medical Education in the United States and Canada' and 'Medical Licensure Statistics'. The figures for dentistry are based on W. J. Gies, *op. cit.,* and on figures furnished by the American Dental Association.

[37] However, physicians are more concentrated in the older age groups than dentists and hence relatively more new entrants are needed to offset deaths and retirements.

[38] These estimates are based on figures given by Meyers, *op. cit.*

[38a] Another important qualification is that a larger proportion of the applicants previously refused than of new applicants may apply to medical schools with relatively low percentages of refusals.

[39] *Bar Examiner,* April issues, 1934-38.

[40] To evaluate on empirical grounds the role this explanation has played would be exceedingly difficult. Such an evaluation would require an analysis of the motives, the acts, and the influence of each group involved in restriction—the American Medical Association and its Council on Medical Education, the individual medical schools, and the state boards of medical examiners. One empirical 'straw' relating to one of these groups and suggesting that this explanation cannot be ruled out completely may, however, deserve mention. At the 1938 meeting of the House of Delegates of the American Medical Association a resolution was passed stating: "it is highly desirable that an additional requirement of full citizenship in the United States of America be demanded" of "foreigners, graduates of foreign institutions, . . . before being admitted to practice". Presumably, the basic reason for this resolution is to prevent so-called 'overcrowding', although one of the 'whereases' preceding the above resolution reads, "in order to convey adequately to these applicants [foreign students] a full and satisfactory knowledge of the American conception of patriotism and of ethical ideas in medicine, it is necessary that a period of residence be required". See *Journal of the American Medical Association,* July 2, 1938, pp. 41ff.

See also A. D. Bevan, 'The Overcrowding of the Medical Profession', *Journal of the Association of American Medical Colleges,* XI (November 1936), 377-85; W. L. Bierring, 'Social Dangers of an Oversupply of Physicians', *Federation Bulletin,* April 1934, pp. 117-20; E. P. Lyon, 'Swans Sing before They Die', *Proceedings of the Annual Congress on Medical Education, Medical Licensure, and Hospitals, 1936;* J. A. Miller, 'Some Problems in Medical Ethics and Economics', *Journal of the American Association of Medical Colleges,* XII (July 1937); C. B. Pinkham, 'Foreign Medical Students', *Federation Bulletin,* May 1938; Raymond Walters, 'Should the Number of Professional Students be Restricted?', *Journal of the American Medical Association,* March 30, 1935.

In the first of the articles listed Bevan advocates further restriction by medical schools because "this struggle for existence

Limitation of the number of physicians dates from the first decade of this century. Initially it was an unplanned by-product of an intensive drive on the part of the medical profession for higher standards of medical education. The consequent rise in standards and decrease in the number of medical schools unquestionably had a salutary influence on medical education and practice. During recent years, however, the limitation in the number admitted to medical schools seemingly represents more than a relative decline in the number of applicants who are willing and able to meet the higher professional standards. "Too many are still unaware", says Harold Rypins, Secretary of the New York State Board of Medical Examiners, "that American medical schools are definitely committed to a policy of restricting the number of their students . . . . Without intention or design, the far-reaching steps taken by the physicians to raise educational standards during the past twenty-five years have resulted in limiting the number of students. Now, realizing the advantages of this unplanned restriction, leaders are taking definite steps to cut down the professional class."[41] It seems clear that such steps have succeeded to some extent in limiting entry.[42]

(*footnote*[40] *concluded*)

when the Council was created . . . . The factors that caused such deplorable conditions then are evidently again at work. These factors are the almost complete dependence on the income from tuition fees for the maintenance of the schools and the consequent failure to limit admissions to carefully selected and well qualified students. Unless this tendency is overcome there must result, inevitably, a lowering of the standards of medical education and practice. The tendency has been receiving the attention of the Council. Educators, state boards of examination, physicians and public authorities may well also give it their consideration." In judging this statement it should be borne in mind that during the thirty years referred to the population of the United States increased over 50 per cent; the number of physicians per 100,000 persons declined from about 156 to about 127; national income per capita rose considerably; and the period of training for medicine lengthened. The statement concerning "the almost complete dependence on the income from tuition fees for the maintenance of the schools" is not substantiated by a study of the budgets for 1926-27 of 63 of the 79 schools then in existence. This study showed that out of a total income of approximately $12 million, only $4 million was obtained from students' fees. It seems unlikely that this situation has changed drastically in the last ten years. See *Final Report of the Commission on Medical Education,* W. C. Rappleye, Director of the Study (New York, 1932), p. 283.

(and this fact cannot be emphasized too strongly) has definitely tended to commercialize the practice of medicine and lower the ethical standards of practice". In the second of the articles Bierring says: "The oversupply of physicians in this country has become a distinct social economic menace that requires the most earnest consideration on the part of organized medicine."

[41] 'Toward Professional Guilds', *Federation Bulletin,* XIX (September 1933), 277.

[42] The Council on Medical Education of the American Medical Association appraises standards of medical education, and issues a list of 'approved' medical schools. In all but three states, either legal requirements or the rules of the Board of Examiners specify that among individuals studying in this country or Canada only graduates of medical schools on this 'approved' list may take the examination for admission to practice.

Late in 1934 or early in 1935 the Council on Medical Education issued a warning "against the admission of larger classes than can properly be accommodated or than can reasonably be expected to satisfy approved scholastic standards". In announcing that this warning had been issued the Council commented: "seven schools have definitely stated that their enrollment will be decreased and others have indicated adherence to the Council's principles" ('Medical Education in the United States and Canada', *Journal of the American Medical Association,* August 31, 1935, p. 686). Every year up to 1934 for which data are available, with the possible exception of 1929, showed an increase in the *number* of applicants accepted, while each year since then has seen a decrease, particularly large ones taking place in 1935 and 1936 (see Zapffe, *loc. cit.*).

The same issue of the *Journal of the American Medical Association* in which the Council announced that it had issued the above warning carried a brief note entitled 'History Repeats in American Medical Education', the following excerpt from which may be of interest: "Thirty years ago there were in the United States 160 medical schools with an enrolment of 26,147 . . . . During the academic year just closed [the number of students] was 22,888. We have returned nearly to the place where we were

As already suggested, we are in no position to judge the relative importance of the possible causes of the restriction of entry into medicine. But whatever the causes, the effect of the restriction seems clear: it has made possible or has maintained a mean income in medicine exceeding that in dentistry by a greater amount than that which might be attributed to the free working of the much abused law of supply and demand. If we accept our figure of 17 per cent as an upper estimate of the excess of mean incomes in medicine consistent with completely free and moderately rational choice of profession, then about half of the observed difference between the incomes of physicians and dentists is attributable to restriction of entry into medicine.

Comments received from several friends who have been kind enough to read the bulletin in manuscript suggest that it may be desirable to emphasize what this section does *not* say. Our conclusions relate solely to the *difference* between incomes in the two professions and say nothing about absolute *levels* of return. We have *not* said that physicians receive more than they deserve, that restriction of admission to medical schools was introduced and maintained to keep up incomes, that standards of medical education ought to be relaxed, or that all applicants should be admitted to medical schools. We hope that no reader will impute to us conclusions of this nature, which would require more data than we present, and would imply the application of a definite social philosophy to specific alternatives. The former we do not possess; the latter is beyond the proper scope of a factual investigation.

6 *Characteristics of the Frequency Distributions of Net Income for the Five Professions*

The average levels of net income and their changes over time tell us much about the income status of the different

groups of independent professional practitioners. But our knowledge is incomplete without a consideration of how incomes vary about these averages, i.e., without a study of the frequency distributions.

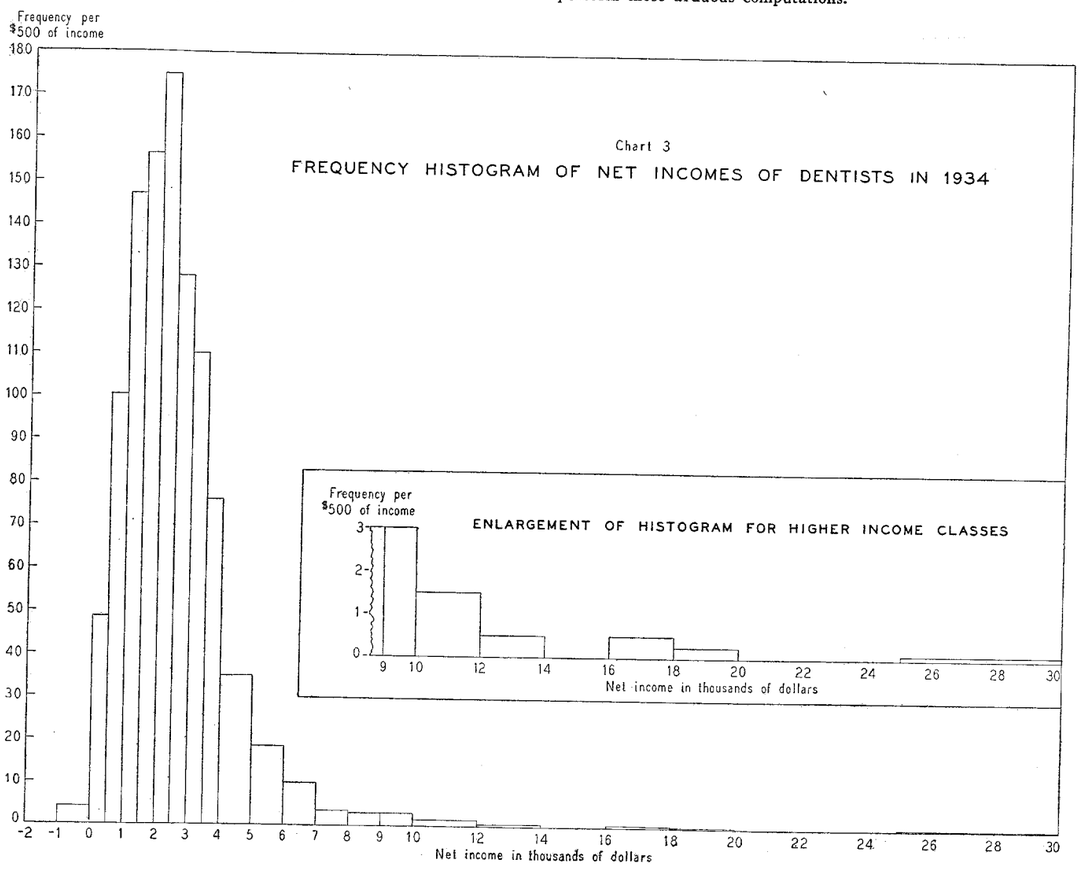
In the analysis of the average levels of income we used each available sample of data for all the years it covered. In studying the frequency distributions we do not follow this procedure. The 1933 and 1935 samples are used for all the years to which they relate—1929-32 and 1932-34; but the 1937 medical and accounting samples are used only for 1934-36 and the 1937 legal sample is not used at all. The omission of the earlier years for the 1937 medical and accounting samples was desirable for reasons of economy. That little information is lost thereby is suggested, though not established, by the consistency among the results of the various samples found in our analysis of the average levels of income. The omission of the 1937 legal sample seemed desirable not only because of the labor entailed by its analysis, but also because, for reasons noted above, its reliability is peculiarly suspect.[43]

One other technical point should be noted before considering the results. The questionnaires sent to lawyers, accountants, and consulting engineers—the three professions in our study that include a significant proportion of firm members—requested the recipient, if a firm member, to reply for the firm as a whole. Except for the firm member bias thus introduced and discussed above (section 2), this in no way affected the average levels of income. It does, however, affect the frequency distributions. For a firm we know only the total income. In obtaining frequency distributions we must perforce divide this total by the number of firm members and attribute this average amount to each

[43] Since the 1937 legal sample was not random among states and, in addition, has a size of community bias, it would have been necessary to obtain separate frequency distributions for each size of community group within each state, each of which would have had to be weighted in combining them. In view of the presumptive unreliability of the data, it scarcely seemed worth while to perform these arduous computations.

Chart 3

FREQUENCY HISTOGRAM OF NET INCOMES OF DENTISTS IN 1934



firm member. In fact, however, firm members do not invariably 'share and share alike'.[44] The actual frequency distributions of the incomes of individual firm members would therefore be more dispersed—in both absolute and relative terms—than the one we obtain by allocating to each firm member an equal share of the total firm income.[45] This bias does not, of course, affect the frequency distributions for individual practitioners; and hence affects the frequency distribution for each profession as a whole to a considerably smaller extent than the distributions for firm members alone. Nonetheless, our data clearly suffer from a bias of unknown magnitude that tends to make the observed frequency distributions of the incomes of lawyers, accountants, and consulting engineers more concentrated than the 'true' distributions.

In general form the frequency distributions for the different professions and the different years are much alike, and similar to frequency distributions of income for other groups. One example will suffice to indicate the general form. Chart 3 depicts the frequency histogram for dentists for 1934. Extreme skewness, wide variability, and great peakedness—these are the hall-marks of distributions of income by size.[46]

The feature of major interest to most persons is the degree of dispersion, or of 'inequality' of incomes, and we shall limit our discussion to this aspect of the frequency distributions. How do the professions differ in this respect, and how does the degree of dispersion change over business cycles?

Although the general meaning of the concepts 'dispersion' and 'inequality' is clear, it is exceedingly difficult to attach a precise and exact meaning to them. About all we can do is to distinguish vaguely and verbally between 'absolute' dispersion—the variability of incomes in terms of dollars—and 'relative' dispersion—the variability of incomes after allowance is made 'in some way' for differences in the level of incomes.

In the absence of any general agreement as to the exact

[44] In the 1937 legal sample firm members were asked to report not only the total firm income, but also their individual income. The relatively few returns received from individual firm members suggested fairly wide differences among the proportions of the total income received by individual members.

[45] To estimate the size of this bias requires knowledge of the relationship among the incomes of the members of the same firm. If total income were always divided equally among the members there of course would be no bias. If the correlation among the incomes of the members of the same firm were zero the variance of the 'true' frequency distribution for members of firms of size n would tend to be n times the variance of the distribution we obtain. In fact, of course, the correlation is greater than zero and the bias is thus between the two limits noted.

[46] The similarity in the general shape of income distributions suggests that a single simple mathematical formula might adequately represent all. If such a formula were available the analysis of our distributions would be straightforward and relatively simple. This procedure is not, however, practicable. Despite the great similarity among different income distributions, there has as yet been found no formula that describes them adequately.

Table 5: Quartiles and Medians of Net Incomes, the Five Professions[1]

Q_3 = the third quartile, the lowest income of the 25 per cent having the largest incomes
Median = the lowest income of the 50 per cent having the largest incomes
Q_1 = the first quartile, the lowest income of the 75 per cent having the largest incomes

		1933 SAMPLES				1935 SAMPLES			1937 SAMPLES		
		1929	*1930*	*1931*	*1932*	*1932*	*1933*	*1934*	*1934*	*1935*	*1936*
Physicians	Q_3	$7,374	$6,559	$5,827	$4,267	$3,791	$3,462	$4,065	$4,290	$4,473	$5,056
	Median	4,223	3,798	3,275	2,400	2,247	2,137	2,378	2,690	2,824	3,100
	Q_1	2,253	1,981	1,600	1,163	1,158	1,068	1,216	1,554	1,588	1,824
Dentists	Q_3	6,003	5,794	4,885	3,512	3,352	2,996	3,304			
	Median	4,080	3,911	3,238	2,414	2,260	2,080	2,266			
	Q_1	2,802	2,599	2,111	1,558	1,420	1,260	1,408			
Lawyers	Q_3					4,339	3,620	3,936			
	Median					2,218	1,906	2,028			
	Q_1					1,140	982	967			
C.P.A.'s	Q_3	9,308	8,560	7,326	5,991	5,029	4,724	5,232	4,967	5,073	5,687
	Median	6,116	5,647	4,780	4,019	3,336	3,129	3,515	3,358	3,460	3,963
	Q_1	4,099	3,883	3,217	2,542	2,235	2,127	2,356	2,296	2,479	2,684
Engineers	Q_3	14,805	11,721	8,631	4,785						
	Median	7,943	6,016	4,041	2,178						
	Q_1	3,570	2,719	1,456	33						

[1] The figures for dentists are *not* corrected for the bias due to the restriction of the dental samples to members of the American Dental Association. The presence of this bias makes the figures for dentists in the table too high, though how much too high there seems no basis for estimating.

For physicians the measures for the 1937 sample are obtained from a frequency distribution which is a weighted aggregate of the distributions for the individual states. The frequency distributions used for lawyers and accountants are adjusted for firm member bias, and for lawyers for a size of community bias as well.

definition of these concepts the only recourse is to use a variety of summary measures and attempt to derive general conclusions from them, recognizing that the different measures are not estimates of the same thing. The particular measures employed in the following discussion are the interquartile difference and the standard deviation as measures of absolute dispersion, and the interquartile range divided by the median, the ratio of the third quartile to the first quartile, the ratio of the standard deviation to the mean, the logarithmic standard deviation, and the Lorenz curve as measures of relative dispersion.[47]

[47] The interquartile difference is the absolute difference between the third and the first quartile. The third quartile is the lowest income of the 25 per cent having the highest incomes; the first quartile, the lowest income of the 75 per cent having the highest incomes. In obtaining the standard deviation, each observation is expressed as a deviation from the arithmetic mean; these deviations are then squared and their sum divided by the number of observations; the square root of the resultant quotient is the standard deviation. The logarithmic standard deviation is the standard deviation of the logarithms of the observations. The Lorenz curve is explained below. The other measures are self-explanatory.

The quartiles and medians for all samples for the five professions are given in Table 5, and the various measures of dispersion in Table 6. Chart 4 summarizes the information the quartile measures provide on absolute dispersion. For each profession and each sample there are two lines in the chart: the upper line shows the difference between the third quartile and the median; the lower, the difference between the median and the first quartile. The vertical distance between the two lines is thus the interquartile difference. In interpreting the measures for dentistry given in Tables 5 and 6, it should be borne in mind that they are not corrected for the bias due to the restriction of the dental samples to members of the American Dental Association. This bias tends to make the quartiles and medians too high. Its effect on the measures of variability is less clear; although there seems fairly good reason to suppose that it makes them too low.

Judged by both the interquartile differences and the standard deviations in Table 6 and Chart 4, the absolute dispersion appears to be greatest for consulting engineers and least for dentists. The three intermediate professions —law, medicine, and accountancy—differ little; although law is perhaps a bit more widely dispersed than the other two. An interesting fact brought out by the chart is that skewness is relatively greater in incomes from law than in incomes from medicine or accountancy. The quartiles and medians in Table 5 are helpful in interpreting the meaning of these differences in absolute variability. The story they tell is particularly interesting for medicine and dentistry. The third quartile in medicine is considerably higher than in dentistry; but the first quartile is considerably lower. Thus the difference in absolute variability means that an individual is more likely to receive a relatively high income in medicine than in dentistry; at the same time, he is also more likely to receive a low income in medicine than in dentistry. In part, this result may simply reflect the bias in the dental sample; but it seems doubtful that correction of the bias would reverse it.

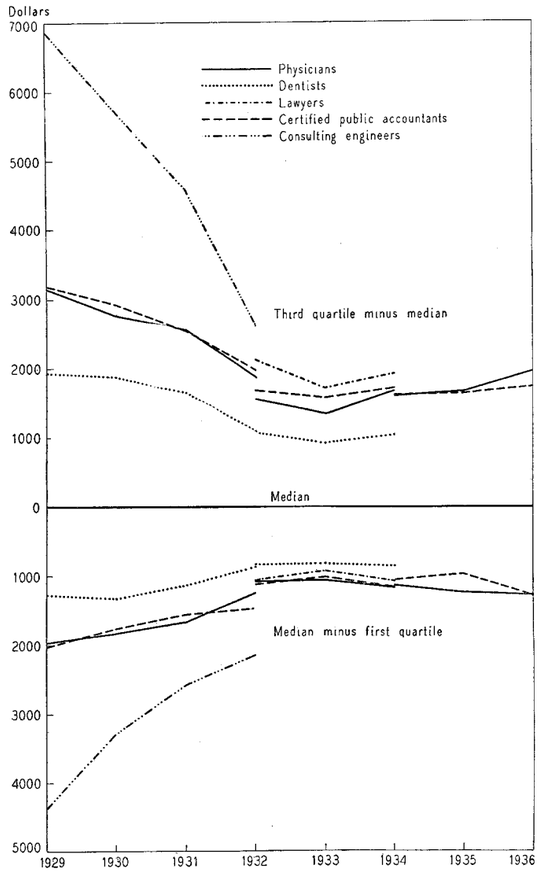
Table 6: Measures of Absolute and Relative Variability, the Five Professions[1]

	1933 SAMPLES				1935 SAMPLES			1937 SAMPLES		
	1929	*1930*	*1931*	*1932*	*1932*	*1933*	*1934*	*1934*	*1935*	*1936*
					Interquartile Difference ($Q_3 - Q_1$) *(in dollars)*					
Physicians	5,121	4,578	4,227	3,104	2,633	2,394	2,849	2,736	2,885	3,232
Dentists	3,201	3,195	2,774	1,954	1,932	1,736	1,896			
Lawyers					3,199	2,638	2,969			
C.P.A.'s	5,209	4,677	4,109	3,449	2,794	2,597	2,876	2,671	2,594	3,003
Engineers	11,235	9,002	7,175	4,752						
					Standard Deviation (in dollars)					
Physicians	6,855	6,448	5,473	4,270	3,947	3,675	4,240	2,965	3,057	3,631
Dentists	3,706	3,653	3,294	2,637	2,363	2,025	2,066			
Lawyers					4,369	4,368	4,164			
C.P.A.'s	6,723	6,410	5,152	3,706	3,568	3,360	3,483	3,072	3,334	3,240
Engineers	14,580	16,669	9,010	6,462						
					Relative Interquartile Difference [($Q_3 - Q_1$) ÷ Median]					
Physicians	1.213	1.205	1.291	1.293	1.172	1.120	1.198	1.017	1.022	1.043
Dentists	.785	.817	.857	.809	.855	.835	.837			
Lawyers					1.442	1.384	1.464			
C.P.A.'s	.852	.828	.860	.860	.838	.830	.818	.795	.750	.758
Engineers	1.414	1.496	1.776	2.182						
					Ratio of Quartiles ($Q_3 \div Q_1$)					
Physicians	3.273	3.311	3.642	3.669	3.274	3.242	3.343	2.761	2.817	2.772
Dentists	2.142	2.229	2.314	2.254	2.361	2.378	2.347			
Lawyers					3.806	3.686	4.070			
C.P.A.'s	2.271	2.204	2.277	2.357	2.250	2.221	2.221	2.163	2.046	2.119
Engineers	4.147	4.311	5.928	1.450						
					Ratio of Standard Deviation to Mean					
Physicians	1.159	1.224	1.199	1.243	1.250	1.265	1.276	.886	.862	.902
Dentists	.746	.783	.826	.896	.864	.843	.787			
Lawyers					1.236	1.390	1.266			
C.P.A.'s	.843	.865	.843	.768	.840	.854	.803	.761	.784	.700
Engineers	1.231	1.647	1.548	2.124						
					Standard Deviation of Logarithms					
Physicians	.3697	.3859	.3932	.3919						
Dentists	.2876	.2963	.2927	.2972						

[1] None of the figures for dentists is corrected for the bias due to the restriction of the dental samples to members of the American Dental Association.

Chart 4

ABSOLUTE DISPERSION OF INCOMES IN THE FIVE PROFESSIONS AS MEASURED BY THE INTERQUARTILE RANGE



So far as temporal changes are concerned, there appears to be a general tendency for absolute dispersion to decrease from 1929 to 1933 and to increase from 1933 to 1936, i.e., to vary in the same direction as the mean income. The decrease is considerably more marked than the subsequent increase; and indeed the evidence for the increase in dispersion is by no means unmixed.

What now of relative dispersion? Chart 5 depicts two measures of relative dispersion—the relative interquartile range and the ratio of the standard deviation to the mean. Although the temporal changes in the two sets of measures differ, both tell the same story with respect to the differences among the professions. Relative dispersion is almost the same for accountancy and dentistry and is smaller for both than for any of the other professions. Engineering shows the greatest relative dispersion. On the basis of the relative interquartile difference, law appears to show considerably greater relative dispersion than medicine. On the basis of the coefficient of variation—the ratio of the standard deviation to the mean—there appears to be little difference between them; this seems to contradict the preceding result, but it really reflects a relatively greater number of extremely high incomes in our samples for physicians than in our sample for lawyers.[48] If we take into account the downward bias in the variability of the incomes of lawyers, accountants, and engineers commented on above, it seems reasonable to conclude, on the basis of these two measures, that the ranking of the professions in order of relative variability of incomes is: engineering, law, medicine, accountancy, and dentistry. The largest differences seem to be between engineering and law, and between medicine and accountancy. This ranking is confirmed by the persistence of the differences in the two measures over the period covered. Additional confirmation is provided by the other measures of relative variability in Table 6, as well as by Chart 6, which presents the Lorenz curves for the various professions for 1929 and 1933—the initial peak and the trough of the cycle covered by our data.[49]

[48] As shown in Table 6, the coefficient of variation is greater for law than for medicine in 1933, but less in 1932 and 1934. However, if, for both the legal and medical samples, the highest income is excluded, the coefficient of variation for law exceeds that for medicine in 1932 and 1934 as well.

[49] The Lorenz curve is a useful device for depicting graphically the degree of relative variability or inequality of incomes. Along the horizontal axis is measured the percentage of individuals, arrayed in order of income. Along the vertical axis is measured the percentage of the total income received by the corresponding percentage of individuals. Thus the various points on a Lorenz curve indicate the proportion of the total income received by the

So far as the differences among the professions are concerned, our several measures of relative variability tell a consistent story. With respect to temporal differences, however, the various measures 'speak with many tongues'. Only for engineering can we say with any confidence just what our data show, let alone what the 'true' changes were; for here all measures indicate a steady and fairly rapid rise in inequality from 1929 to 1932. For the other professions, about all we can say with confidence is that changes in relative variability have not been great; in other words, differences in levels of income account for the largest part of the temporal changes we have found in absolute variability.

(*footnote*[49] *concluded*)

1 per cent, 2 per cent, etc. of individuals with the lowest incomes. If each individual received the same amount of income, it is evident that the percentage of income would be the same as the percentage of individuals, and that the Lorenz curve would be a straight line. The straight diagonal lines in Chart 6 are thus designated the lines of equal distribution. The greater the divergence between the observed Lorenz curve and the line of equal distribution the greater the inequality of incomes. (M. O. Lorenz, 'Methods of Measuring the Concentration of Wealth', *American Statistical Association Publications,* New Series, No. 70 (June 1905), pp. 209-19)

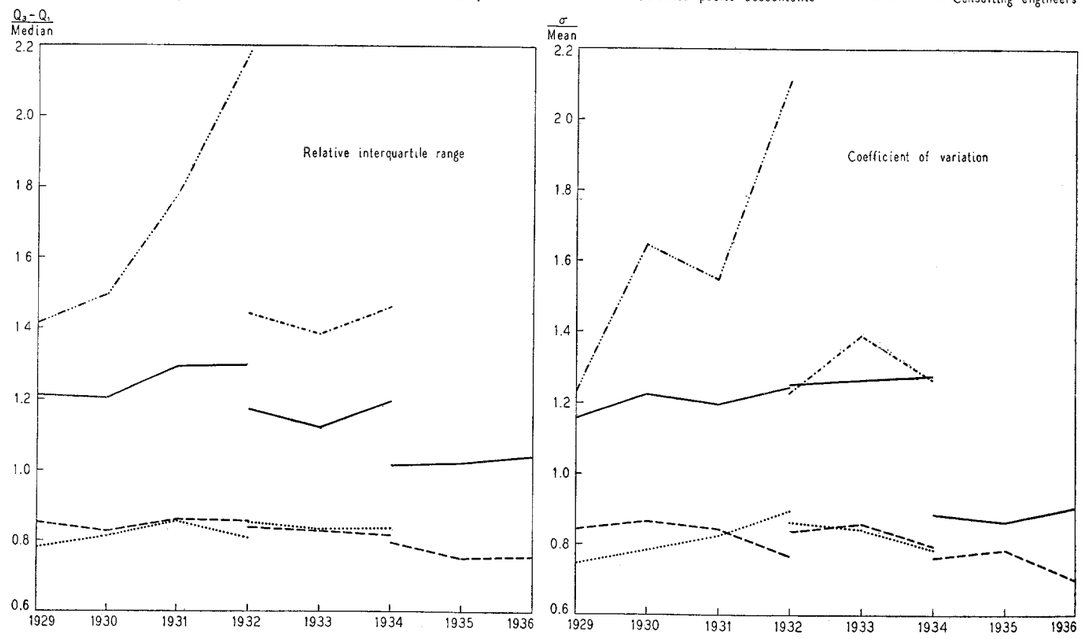
In addition to the measures summarized in Table 6 and Chart 5 we have the results of a study of the Lorenz curves for the various samples and professions. The greatest differences for any profession or sample—other than consulting engineers—are for the 1933 sample of physicians, for which the Lorenz curves suggest a steady growth in inequality from 1929 to 1932. Yet even here the largest vertical difference between the 1929 and 1932 curves, when the two are plotted on a chart ten inches square, is three-tenths of an inch. It is thus obvious why we present no charts giving the Lorenz curves for the same profession and sample for different years; if these were reduced to the size of the sections of Chart 6, in only one or two cases would it be possible to distinguish the different curves.

If we combine the information furnished by the Lorenz curves and by the measures in Table 6, there is some, but by no means unmixed, evidence of a slight rise in inequality from 1929 to 1932 for all professions, except possibly accountancy. From 1932 to 1933 there is no agreement among the various measures as to the direction of the change in inequality in medicine or law, slight evidence of a decrease in inequality in dentistry, and fairly clear indications of an increase in accountancy. From 1933 to 1934 inequality seems to increase in medicine, and to decrease in dentistry

Chart 5

MEASURES OF RELATIVE DISPERSION OF INCOMES

THE RELATIVE INTERQUARTILE RANGE AND THE COEFFICIENT OF VARIATION



and accountancy; 'no agreement' is again the verdict for law. From 1934 to 1936 the evidence favors a slight increase in inequality in medicine and a slight decrease in accountancy.

The general tendency of inequality to rise during 1929-32, when average incomes were falling rapidly for all professions, suggests the hypothesis that the degree of inequality is inversely related to the level of income. For accountancy alone do the results for the later samples give any direct support to this hypothesis. Although the results for law and dentistry lend no support to the hypothesis, they do not contradict it. This is not so with medicine, the behavior of which is, on the whole, exactly contrary to what would be expected were the hypothesis valid. This contradiction could be resolved by postulating an upward secular trend to inequality in medicine and interpreting the slowness of the rise in inequality from 1933 to 1936 relative to the rise from 1929 to 1932 as the result of the rise in average income during the later period. The differences between the various medical samples make this interpretation untenable; for each sample seems to show less inequality of income than the preceding sample. This suggests that the secular trend of inequality in medicine has been downward rather than upward.

In short, the only simple hypothesis concerning the relation of inequality to general business conditions and the average level of income that seems consistent with our findings is that there is none and that the observed differences are chance phenomena. Our findings relate, however, not only to a very brief period, but also to composite distributions including all geographical regions, all sizes of community, and all types and organization of practice. It might thus well be that the absence of consistency in the behavior of the national distributions reflects the changing importance of different subgroups, or compensating changes between the subgroups, combined with exceedingly consistent behavior of each subgroup. Whether this is so could be determined only by an analysis of data for smaller and in some sense more homogeneous segments of the various professions. This we do not attempt in this bulletin. Our conclusion, therefore, as to the apparent absence of any consistent relation between changes in the inequality of incomes from professional practice and the average level of income should be regarded as exceedingly tentative.

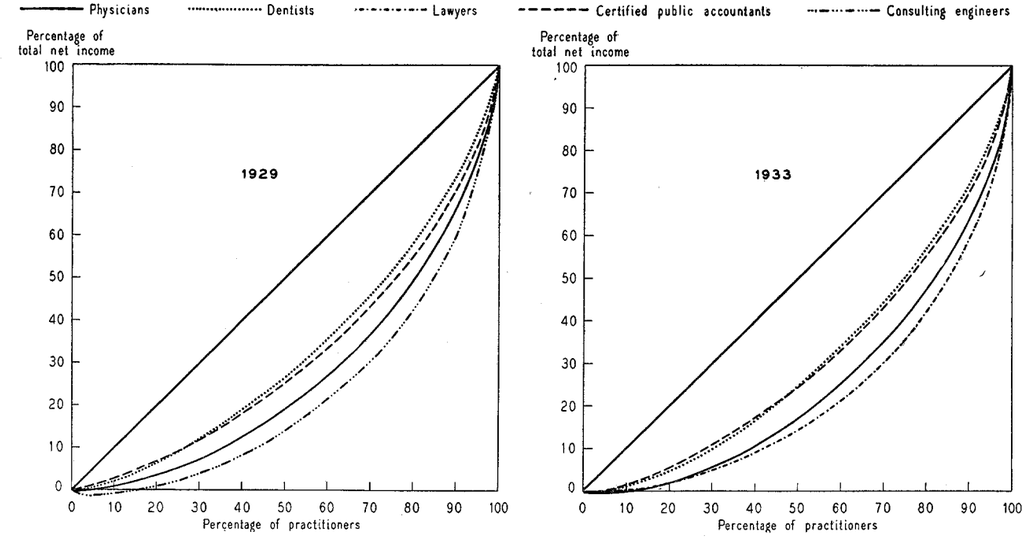
7 *Factors making for Differences in Inequality among the Five Professions*

Finally, we consider briefly what explanation, if any, can be offered for the wide diversity of incomes characteristic of all the professions and for the rather sizable differences in the degree of inequality of incomes among them.

In many ways the basic factor making for wide diversity of incomes among professional practitioners is that professional activity seems to be subject to an exceedingly wide range of qualitative variation. The complex character of professional functions, which necessitates the extensive training required, accounts for a large part of the wide qualitative range in the performance of these functions.

Chart 6

LORENZ CURVES SHOWING DISTRIBUTION OF INCOMES IN 1929 AND 1933



This qualitative variation is, other things the same, of greatest importance for the professions that render service to individual consumers—medicine, dentistry, law, etc. The highly individualized nature of the service provides greater opportunity for variation in quality; in addition, and perhaps of even greater importance, the highly specialized and complex nature of the service obviously makes it impossible for the individual to judge its quality objectively. Enormous differences in what the individual *thinks*—in many cases, for entirely irrelevant reasons—the quality of the service is, are thus superimposed on the already wide variations in its objective quality. This factor is minimized but not entirely absent when large scale business enterprises are the purchasers of the service; the larger amount of the service individual business enterprises are likely to purchase makes it easier for them to secure objective evidence on quality; and their greater emphasis on economic rationality makes it more likely that they will do so.

This characteristic feature of professional activity is in part a result of, and its influence is greatly strengthened by, another feature, the inseparability of the service rendered from the person rendering it. If consumers consider a particular type or brand of a commodity of superior quality, this judgment will find its major expression in an increase in sales. But multiplication of goods of identical quality cannot go very far in the case of professional services. The quality of the service is, in the main, inseparably linked with the particular practitioner who renders it; and the quantity he can render is narrowly limited, more so, of course, in some professions than in others, but in all to a far greater extent than in the production of standardized commodities.

Several related results flow from this limitation in the quantity of services of a specified quality. First, the greater demand for the services of a certain quality, i.e., of a certain practitioner, must be reflected primarily in the price paid. The major differences among the incomes of independent practitioners might thus be expected to be in the prices they receive for their services rather than in the quantity of services they render. In view of the varying economic status of the purchasers of the service, this will presumably mean fairly extensive stratification in terms of the economic status of practitioners' clientele. Second, the elimination of services considered inferior in quality through the competition of services considered superior cannot be carried far. The increase in the quantity of a brand or a type of commodity generally considered superior in quality inevitably results in an elimination of brands or types considered inferior and thus leads to important limitation in the variation in the quality of commodities currently produced. So far as the valuation consumers place on professional service is contingent upon the nature of the training received by the practitioners, the same process is presumably at work. But, even if we exclude differences in innate technical ability, other factors are obviously of far greater importance. The judgments of consumers concerning the quality of professional service are inevitably based on so many factors entirely unrelated to technical competence that even complete identity of the training and innate technical ability of all practitioners would reduce but little the variation in what consumers *think* the quality of the service is. Moreover, of prime importance among the factors affecting consumer judgments are 'reputation' and 'renown' which, by their very nature, are both restricted to a relatively few and are cumulative in character.

Consumers of course differ in their judgments of the quality of competing commodities and professional services; and such differences would necessarily make for considerable variation in the quality of items currently produced. The essential point, however, is that even generally accepted differences in judgments of quality of professional services will not greatly reduce the degree of quality variation because of the limitation in the quantity of services that can be rendered by a particular practitioner. An additional but perhaps minor point is that producers of commodities can and do resort to advertising designed more or less successfully to standardize consumers' quality judgments, whereas, among professional practitioners, such advertising is considered unethical.

These considerations relate almost entirely to the 'demand' side. On the 'supply' side the factors making for diversity of incomes—differences in technical skills, business abilities, social connections, geographic location, and the like—are much the same as in other entrepreneurial pursuits. The circumstances already discussed, however, enhance the extent to which they can produce variations in income.

The differences in the diversity of incomes as between the different professions are presumably to be explained by differences in the features just discussed. Consider, for example, medicine and dentistry, the two professions that serve almost exclusively the final consumer. There would probably be general agreement that judgments concerning the quality of the services rendered vary somewhat less for dentistry than for medicine; first, because the services rendered by dentistry are intrinsically less variable and more standardized—note the smaller degree of specialization in dentistry than in medicine; second, because they are less complex and easier for a layman to judge; third, because individuals are likely to purchase—and to know that they are purchasing—the same type of dental service from time to time, whereas each unit of medical service purchased is considered different from every other unit. This difference in the variability of quality judgments alone would tend to produce less diversity of incomes in dentistry than in medicine.

There is, however, a second and more important factor that would tend to produce the same result, even in the absence of any difference in the degree of variability of quality judgments. Medical services are ordinarily deemed more essential than dental services, i.e., the individual's demand for them is more inelastic. A smaller incentive is required to induce an individual to patronize a dentist he considers inferior to another than to patronize a physician he considers inferior. Thus with the diversity of quality judgments in some sense the same for medicine and dentistry, *prices* would vary more among physicians. Given approximately equal opportunity to expand the quantity of services rendered, this would inevitably result in a greater diversity of incomes among physicians. In fact, the possibility of expanding the quantity of services rendered—through, for example, the use of assistants—is probably somewhat greater among dentists than physicians; but the difference can scarcely be large.

Both the greater variability of quality judgments about, and the greater importance attached to, medical services as compared with dental services thus work in the direction of making the diversity of incomes among physicians greater than among dentists, and help to explain the difference shown by our data.

The situation is similar in engineering and accounting, the two professions serving business enterprises almost exclusively. Much of the accountant's work is routine and regular in character—the books must be audited periodically and each audit is much like the preceding one. Consulting engineers, on the other hand, are typically required only in connection with a new undertaking, different in nature from preceding ones. Their services are seldom required periodically. Thus, not only is there greater intrinsic variability in the type of work they perform; but the purchasers of their services rarely have the opportunity to 'shop around', to experiment under similar conditions now with one practitioner, now with another; or even to specify very exactly the nature of the work required. Once again, to the greater intrinsic variability of the engineer's work is added the greater importance attached to making the proper choice of practitioner; that is, the costs incident to an erroneous choice are greater. And thus, presumably, arises the very much greater diversity of incomes among consulting engineers than among accountants.

Law, the one profession we cover that serves to a significant degree both ultimate consumers and business enterprises, is for that reason exceedingly difficult to compare with any of the other professions. If lawyers catered exclusively to ultimate consumers we might expect *a priori* their incomes to vary more than those of dentists and less than those of physicians. On the one hand, if a comparison among such dissimilar things can validly be made, the services rendered by lawyers would seem to be more complex in nature and more difficult for laymen to judge than dental services; possibly they fall in much the same category as medical services. On the other hand, repeated purchases by the same individual of the same type of service are more frequent in law than in medicine, but less frequent than in dentistry, and the importance attached to legal services is in general probably intermediate between that attached to dental and medical services. In addition, the lawyer's performance is clearly subject to a more explicit and objective test than that of the physician; though less clearly, this is probably also true if the lawyer's performance is compared with that of the dentist.

If lawyers catered exclusively to business enterprises we might with considerable confidence expect that their incomes would vary more than those of accountants; with much greater hesitancy, we might conclude that they would have incomes less unequal than engineers. For legal services, while less regular and periodic and standardized than accountants' services, are probably more so than those rendered by consulting engineers. Also, when needed, they are probably more frequently considered of great importance than accounting services. What relative importance is attached to legal and engineering services is more difficult, if not impossible, to say.

Actually, lawyers cater exclusively to neither final consumers nor business enterprises but to both. And our data suggest that lawyers' incomes are more unequal than those of either dentists or accountants, less unequal than those of engineers, and more unequal than those of physicians.

Both our data and, as a result, our discussion have been limited to income from independent practice. This limitation means that while our analysis may contribute to an understanding of the economics of independent professional practice, it is not directly relevant to an understanding of the economic status of independent professional practitioners. The latter would require consideration of the total incomes of individuals or, even better, of families, rather than of only a limited portion of their incomes. The restriction would not be serious were it possible to pass easily from conclusions relating to incomes from independent practice to conclusions relating to total income. But this is not the case. Whether the variability of total incomes will be greater or smaller than that of incomes from independent practice depends on the relation between this part of total income and the rest. If, for example, independent practitioners with large incomes from their independent practice tend also to have large incomes from subsidiary salaried positions while those less fortunate in their independent practice are also less fortunate in their salaried connections, then the variability of total income from professional practice would presumably be greater than the variability of income from independent practice. If, on the other hand, small incomes

from independent practice are a result of devoting considerable attention to salaried posts, then the reverse might well be the case. Similar problems arise in attempting to pass from total professional income to total income from all sources and from individual income to family income. How does income from property combine with professional income? Does large income from property tend to mean a social status that makes possible large income from professional activities? Or does it mean that professional practice becomes a side-line activity in the nature of an avocation rather than a vocation?

Inter-professional comparisons might also be affected by the inclusion of income from sources other than independent practice. Opportunity to obtain such incomes obviously varies from profession to profession; and the relation between income from independent practice and from other sources might well differ materially for different professions.

This problem of the composition of incomes, of how different sources of income combine, is, of course, relevant not only to professional groups but also to virtually all studies of the distribution of income. It is a problem on which our data at present are exceedingly meagre; but one to the analysis of which studies now in progress promise to contribute much needed information.

APPENDIX

1 *How the Effect of Difference in Length of Training is Estimated*[1]

As stated above in section 5a, the period of training in medicine is approximately three years longer than in dentistry. Our present task is to estimate the difference in average incomes that would compensate for the extra costs entailed by the three-year difference in length of training.

Let V = the present value of the returns in dentistry for all but the last three years of the dentist's working life;

v = the present value of the returns in dentistry for these last three years;

c = the present value of the extra costs incident to obtaining a medical education;

i = the interest rate at which future returns and costs are discounted. This is the rate implicit in the three present values just defined.

V, v, and c may be computed as of any date. For convenience, we take them to refer to the date of beginning the practice of *dentistry*.

In order that the two professions be financially equivalent, each installment of income from medicine would have to bear to the 'corresponding' installment of income from dentistry, i.e., to the installment received the same number of years after beginning practice, a ratio

$$k = \frac{V+v+c}{V}\cdot(1+i)^3.$$

The numerator of the fraction is the present value of the income sacrificed by an individual choosing medicine plus the present value of the extra costs of a medical education. It thus indicates what the present value of the physician's series of returns would have to total, if they were received at the same dates as the dentist's returns, in order to be equal to the total financial sacrifice made in choosing medicine. The denominator of the fraction is the present value that would be sacrificed by the physician if there were no difference in working life or in costs of education. The ratio of the two gives the figure by which each installment of income entering into V would have to be multiplied in order that their present value should equal the numerator of the fraction.[1a] The second part of the expression allows for the fact, so far neglected, that each installment of income from medicine is received three years later than the 'corresponding' installment from dentistry.

Since k is the ratio between 'corresponding' installments of income, it can be interpreted as the ratio of the average annual income from medicine to the average annual income from all but the last three years of dentistry. In order to obtain the ratio of average incomes, where for both professions the averages relate to the entire working life, we need to know the ratio of the average income from dentistry during the last three years to the average income for the rest of the period. Call this ratio p, and let y equal the length of the dentist's working life in years. Then R, the ratio of the average income in medicine to that in dentistry, where both averages relate to the entire working life, is given by

$$R = \frac{yk}{(y-3)+3p}.$$

The numerical values used in the computations are:

V = $93,684	i = .04
v = 2,316	p = 0.9
c = 709	y = 45

From these, k is found to be 1.161, and R, 1.169. The facts and assumptions underlying these figures are:

(1) The relevant costs during the period of training are taken to include solely special expenditures for education and do not include living costs, i.e., they do not include board and lodging, clothing, etc. This restriction of costs to tuition fees, professional equipment, and the like is the only procedure consistent with our treatment of future returns. Were living expenses included as costs during the period of training, it would logically be necessary to include them also in whole or in part as costs during the years when income is received, and to make some assumption as to the relative expenditure for living costs in each profession that could be considered in some sense an 'occupational expense' rather than expenditure for ultimate consumption. Such a procedure is neither feasible nor logically desirable. Similarly, the income that might have been earned during the period of training is not to be considered a cost. For a comparison restricted to medicine and dentistry the only alternative income that is relevant is the income the medical student might have earned as a dentist during his last three years of training. But this is already taken into account in the present value of the dentist's series of expected returns; to include it as a cost for the medical student would allow for it twice.

(2) The costs of the six years of training in dentistry have been assumed equal to those of the first six years of medical training. This is clearly valid for the pre-professional training. That it is not far wrong for the two overlapping years in professional school is suggested by the figures on costs of medical and dental education given by two surveys of students' expenditures: one, by R. G. Leland, dealing with medical students and nationwide in scope, the other dealing with dental students and restricted to Minnesota.[2] The rest of the period, either one or two years, is one of professional training for the dental student and of pre-professional training for the medical student. The costs for this period are doubtless higher for the dental student. However, the difference cannot be very large.

(3) For the extra three years of medical training the costs have been assumed to total $750: $400 for the first year, $350 for the second, and zero for the third. The figures for the first two years are approximately equal to those given by Leland[3] for 'Tuition and Fees' and 'Medical Books, Instruments, etc.' for the third and fourth year of medical school respectively. The last of these three extra years is typically the year of interneship. Ordinarily an interne receives at least his room and board and occasionally a modest stipend. The monetary value of these returns certainly more than covers any extra professional costs. Logically, the excess should be regarded as a positive income item, counterbalancing the extra costs. In the absence of any data on its amount we have disregarded it. Similarly, we have disregarded any earnings during the other two years, although according to Leland's figures, these averaged almost $125 per student per year.

(4) Training costs, other than those incurred during the first nine years by physicians and the first six years by dentists, have not been allowed for. In both professions, persons desiring to become specialists frequently receive additional formal training, either before beginning practice or at a later date. Since a much larger proportion of physicians than of dentists are specialists, the neglect of the costs of special training tends to make too small our estimate of R, i.e., our estimate of the difference in incomes that would make the two professions equally attractive financially.

(5) The capital investment necessary to equip an office to begin dental practice has been assumed equal to that necessary for beginning medical practice and hence does not enter our formula. The 'Report of the University Relations Committee'[4] gives $1,782 as the average cost of equipment to 34 dentists who began practice in 1934 and 1935. This is probably greater than the average amount spent by beginning medical practitioners.

(6) The present value of returns from dentistry over the entire working life, as of the date of beginning practice, is taken as $96,000, the figure given by Harold F. Clark.[5] It supposedly relates to the period 1920-36, is based on an interest rate of 4 per cent and a working life of 45 years, and makes no allowance for the probability of earlier retirement through death or for other reasons, except in the estimate of the working life. Clark gives also a figure of $108,000 supposedly relating to 1920-29. The use of the smaller figure yields a slightly higher estimate of R.

(7) The working life has been taken as the same for all individuals in each profession and as equal to 42 years for physicians and to 45 years for dentists. These are the figures given by Clark[6] and are the only ones that would be consistent with assumption (6). Clark's estimates of average working life assume retirement only through death.[7] Hence, they are probably somewhat too large. In addition, the use of average expected working life instead of maximum working life is the only way that allowance is made for the possibility of retirement through death or for other reasons before or after the completion of the assumed working life. It is doubtful that this method makes sufficient allowance for the influence of differences in length of life. These deficiencies affect our results in three ways. Our esti-

[1] A friend suggests that perhaps the chief value of our procedure is to demonstrate the difficulties involved in a serious attempt to choose between professions on strictly financial grounds, and the uncertain applicability of the most careful calculations to the fortunes of a given individual in the uncertain future. He suggests that an appreciation of these difficulties and uncertainties goes far toward explaining and perhaps justifying the loose methods by which young men seem to form their expectations and choose their occupations.

[1a] It should be noted that the installments of income entering into V are not assumed equal, but may be taken to vary in any desired fashion with the number of years in practice.

[2] R. G. Leland, 'The Costs of Medical Education', *Journal of the American Medical Association,* XCVI (February 28, 1931), 682-90; 'Report of the University Relations Committee', *North-West Dentistry,* XV (April 1936), 79-88.

[3] *Op. cit.,* Table 5.

[4] *Op. cit.,* p. 84. The figure cited does not include the cost of equipment purchased while in dental school. This averaged approximately $500.

[5] *Life Earnings in Selected Occupations in the United States,* by H. F. Clark, with the assistance of Mervyn Crobaugh, W. I. Gooch, B. J. Horton, and R. N. Kutak (Harpers, 1937), p. 43.

[6] *Ibid.,* pp. 43 and 79.

[7] *Ibid.,* pp. 46, 79, and 150.

mate of R tends to be too small, first, because the assumed period over which the training costs of physicians can be recovered is too long, and second, because insufficient allowance is made for the lower certainty to physicians than to dentists of 'corresponding' installments of income. Our estimate tends to be too large because we assume that the dentist is certain to receive his three extra installments of income. It is difficult to estimate how the corresponding adjustments would balance out, but we suspect that, on the whole, this deficiency tends to make our estimate of R too small. However, rough and approximate computations suggest that the maximum error from this source is probably about 2 per cent, i.e., that making accurate allowance for the probability of living to each age would be unlikely to raise our estimate by more than from 17 to about 19 per cent.

(8) The average income of dentists during the last three years of their working life has been taken as $4,333—the figure given by Maurice Leven for the average income in 1929 of dentists in general practice who graduated from dental school between 1890 and 1894, i.e., in practice between 35 and 39 years.[8] The restriction to general practitioners probably tends to make this figure too low. However, 89 per cent of Leven's sample were general practitioners. Moreover, this tendency is probably more than counterbalanced by two other factors: first, the figure relates to dentists in practice 35 to 39 years, whereas we are using it for dentists in practice 43 to 45 years, and the average income of dentists is known to decline with age throughout this range; second, it relates to 1929, whereas we use it in connection with figures based on the period 1920-36 (see point 6 above).

(9) The ratio of the average income of dentists during the last three years of their working life to their average income for the rest of their professional career is taken as 0.9. This figure is based on Leven's data and is consistent with assumption (8).

(10) The interest rate to be used in discounting future returns and costs was taken as 4 per cent.

Deficiencies in assumptions (2), (3), (5), and (8) all operate in the direction of an overestimate of R, whereas only (4) clearly operates in the opposite direction, although (7) probably does as well. Assuming an interest rate of 4 per cent, our estimate of 17 per cent would therefore seem unlikely to be much of an underestimate, if, indeed, it is not an overestimate of the percentage excess in the average expected return of physicians over that of dentists which would make the two professions equally attractive financially to a prospective practitioner.[9]

Changes in the interest rate that is assumed would affect the result considerably. The absence of figures on the present value of life earnings based on any other rate makes it difficult to derive any estimates even as rough as the one made for a 4 per cent rate. However, some indication of the influence of a change in the interest rate is provided by computing the allowance necessary for the postponement of the income stream for three years. This allowance is 12.5 per cent for an interest rate of 4 per cent; 6.1 per cent for an interest rate of 2 per cent; and 19.1 per cent for an interest rate of 6 per cent. The total allowance would probably be about 11 or 12 per cent for an interest rate of 2 per cent, and 22 or 23 per cent for an interest rate of 6 per cent.

The only justification so far given for the use of an interest rate of 4 per cent is that there are no figures on the present value of life earnings based on any other rate. In view of the fairly considerable difference that the use of another rate would make in our estimate, this alone is clearly an inadequate justification. Just what interest rate should theoretically be used depends on what function it is to perform. If the interest rate is to include an allowance for 'uncertainty' of one sort or another, we ordinarily, though not always, would conclude that the rate used should be higher than if it is to serve solely the function of allowing for the postponement of income considered certain.[10]

In the present instance we have attempted to allow for the various possible types of uncertainty directly rather than through the medium of the interest rate. The uncertainty arising from the variability of incomes we consider in section 5b: the uncertainty of success is but another aspect of variability of incomes. The uncertainty arising from variability of length of life we consider in assumption (7) above. The uncertainty arising from temporal variability of incomes is relevant only so far as medicine and dentistry differ in this respect. It is doubtful that there is such a difference, but even if there is, it can hardly be large. Thus the relevant interest rate from our viewpoint is one that makes no allowance for uncertainty. In view of the alternative opportunities for investment open to prospective practitioners, there would probably be little disagreement that 4 per cent is not too low a figure to use as the 'riskless' interest rate but rather, if anything, too high.

[8] *The Practice of Dentistry,* p. 125.

[9] From the point of view of the argument in Section 5 above, an overestimate is the 'safer' result, i.e., the conclusions we draw would be strengthened if the correct figure were below the one we use.

[10] It is by no means clear that 'uncertainty' necessarily raises the rate at which future returns are discounted, or, what is the same thing, lowers the capital value attached to an expected income stream. The fact that it is the 'expected' income stream that is capitalized already takes account of one aspect of uncertainty: the 'uncertainty' implies the possibility of receiving an income stream larger or smaller than the 'expected' stream. An additional allowance needs to be made only so far as the existence of uncertainty is itself a deterring or attracting factor: the interest rate should be raised if it is a deterring factor, and lowered if it is an attracting factor. Moreover, the magnitude of the allowance that should be made cannot be determined solely on the basis of a single expected income stream taken by itself, even if we know the items underlying the computation of the expected income stream, namely, the different income streams conceived of as possible and the probability attached to each. The allowance to be made will depend as well on the number of different investments an individual—or other economic unit—contemplates making and on whether there is independence among the various investments with respect to the probabilities attached to the different possible returns from each. The greater the number of independent investments, the greater the degree of diversification of risk, and the smaller the allowance needed for uncertainty, i.e., the smaller the degree of uncertainty attached to the investments viewed as a whole.

2 *Demand and Supply Curves for Professional Services*

The analysis in section 5 implicitly uses concepts of demand and supply that differ somewhat from those ordinarily employed. For this reason it is important to describe these concepts explicitly.

In orthodox analysis the quantities demanded and supplied are presumed to be functions of 'price'; and the price refers to each individual item supplied and demanded; i.e., it is assumed that the supply and demand curves relate to commodities or services that sell in the same market for the same price. In an analysis of medical and dental services, however, it is not obvious even what the relevant unit of service supplied or demanded is. And no matter how this 'unit' is defined, there is clearly no single price at which it sells; rather, there is a frequency distribution of prices.

a *The supply curve*

On the side of supply, the relevant 'unit' seems to be the individual practitioner. The quantity of service any individual stands ready to offer depends but little on the 'price' he can secure, although, of course, the quantity he actually renders doubtless does depend on the 'price' the consumer must pay. The total amount of service the profession stands ready to offer thus depends primarily on the number of practitioners. Over short periods the number of practitioners is little if at all affected by the current economic fortunes of the profession. Individuals rarely leave the medical or dental profession to take up other pursuits; death and voluntary retirement are the principal reasons why individuals leave either profession. Similarly, the number entering the profession is determined largely by the number currently graduating from professional schools and passing the licensing examinations. Over longer periods, the number of withdrawals from the profession is still almost completely determined by non-economic factors; but this is not true of the number seeking to enter. The brighter the economic prospects of one profession relative to others, the greater the number of individuals who may be expected to seek to enter it. Thus, over longer periods, economic factors affect the supply of service offered, i.e., the total number of practitioners, primarily through their effect on the number who seek to enter the profession.[11]

The 'price' that determines the 'supply' of entrants is clearly the income or returns that individuals count on receiving. But this 'price' is not a single figure. Incomes received differ greatly as between communities and types of practice. Moreover, for any particular community and type of practice, individuals recognize that the return they receive may vary between exceedingly wide limits, and, indeed, the degree of variation conceived of as likely is one of the factors affecting their decisions. Under these conditions, what meaning can be attached to a supply curve of the sort we have implicitly used; namely, one in which the number of individuals deciding to enter a profession is treated as a function of expected arithmetic mean income?

Fundamentally, the situation is not as different from the usual one as might appear offhand. In order to draw any supply (or demand) curve it is necessary to make assumptions—explicitly or implicitly—about 'other things'; the supply curve would be different if these 'other things' were different. In the present instance the nature of the expected probability distribution of returns—both between and within communities and types of practice—must be treated as one of these 'other things'. This does not mean that we need assume this distribution to have a particular structure identical for all values of expected mean income; it may rather be interpreted as meaning that each value of the expected mean income corresponds to a particular structure of the probability distribution. Further, the fact that the supply curve must be drawn under definite assumptions concerning the nature of factors other than those explicitly included in the curve does not mean that these other factors are neglected or treated as of no importance. Rather, it means that changes in them are treated as producing 'shifts' of the curve rather than movements along it. Thus in our analysis we first consider the nature of the supply curves under the assumption that all factors other than expected mean returns are 'neutral' as between medicine and dentistry; we then attempt to evaluate the 'shift' in these curves that results from the existing differences in these

[11] This statement assumes of course, relatively free entry. If the number permitted to enter is fixed, then the supply of practitioners will be almost completely independent of the economic fortunes of the profession. We abstract from restriction of entry in our analysis of the 'equilibrium' difference because a major purpose of determining the 'equilibrium' difference is to estimate the portion of the observed difference attributable to restriction of entry, and to do this we need to know what the actual difference would be were entry free.

factors, including the expected probability distribution of returns.

So far the analysis has indicated no reason for selecting expected mean income as *the* variable to be used in drawing the supply curve. Indeed, our analysis has suggested that, formally at least, it makes no difference what summary figure is used as the ordinate of the curve. The median or mode or any other characteristic of the probability distribution of returns would do just as well. Any point of the supply curve is determinate only because definite assumptions are made concerning the nature of the probability distribution of returns that corresponds to that point. But this means that we can, in theory, determine the value of the median or mode, etc., that corresponds to that point. Thus, from a supply curve using one summary figure as the ordinate we can easily pass to a supply curve using any other summary figure.

In practice, however, there is a very good reason for using the expected arithmetic mean rather than any other summary figure. If we abstract from all factors affecting the choice of a profession other than actuarial ones, then the supply of new entrants depends solely on the relative arithmetic mean returns and costs.[12] The nature of the probability distribution of returns is of little or no importance. The most convenient procedure is thus to begin with an analysis of the influence of the actuarial factors, and then to modify the results obtained by an analysis of the influence of the non-actuarial factors. Since in dealing with the latter factors it makes little difference what summary figure is employed, it is simplest to retain the arithmetic mean throughout. Moreover, as we shall indicate below, the arithmetic mean income seems the relevant figure for an analysis of demand.

b *The demand curve*

On the side of demand as well as of supply there is no easily specified 'unit' or a single 'price'. Individuals demand 'medical service' or 'dental service'. But not only does 'medical service' cover a wide variety of services differing in quality and 'quantity'; also, the price paid for supposedly the same quality and quantity of medical service varies as between different 'customers' of the same physician (the 'sliding scale') and as between different physicians. Moreover, the character of the items composing the complex bundle 'medical service' is to a minor extent at the choice of or determined by the purchaser. The 'purchaser' selects the physician; the physician selects the items the 'purchaser' buys. The only thing that thus seems relevant is the total sum that consumers as a whole are willing to spend for medical services.

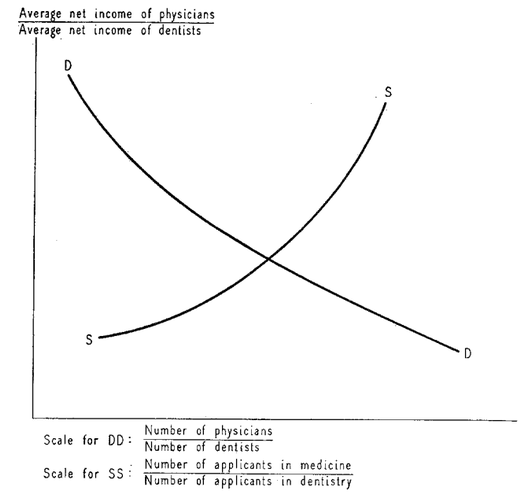
[12] This is probably most easily seen by analogy with the practice of insurance companies. For example, if fire insurance premiums were based on the median loss, they would be zero.

The total sum that consumers are willing to spend depends, in part, at least, on the total number of practitioners. This is a result both of the reduction (increase) in monetary and non-monetary costs to consumers effectuated by the greater (smaller) availability of practitioners and of the habituation fostered by their presence. The importance of the number of practitioners as a determinant of the sum consumers are willing to spend is, moreover, enhanced by the customary character of medical and dental scales of fees, and the almost complete absence of direct price competition. We may, therefore, conceive of a demand curve for 'physicians' in which the 'price' is the average gross income per physician and the 'quantity' the number of physicians. But we cannot use this demand curve for our purposes. It is the average *net* rather than *gross* income that is the relevant figure from the point of view of the prospective practitioner. However, to each possible value of total gross income there corresponds a fairly determinate value of total net income. We can thus pass from a demand curve in which the 'price' is the average gross income to one in which the 'price' is the average net income. This demand curve, moreover, can be taken as negatively sloped: although an increase in the number of physicians might result in an increase in the total amount of money spent, it seems exceedingly doubtful that it would result in a proportionate or more than proportionate increase in total expenditures on medical care. It is this type of demand curve that is employed in our analysis and that underlies our rough estimate of the increase in the ratio of physicians to dentists that would be necessary to reduce the ratio of their incomes from 1.32 to 1.17 (see section 5d and footnote 30).

A demand curve of this type is, of course, not theoretically determinate unless assumptions are made about the behavior of 'other things'. In the present instance the most important of these is the way additional practitioners would be distributed among regions, sizes of community, and types of practice. The effect on average net income of any given addition to the total number of practitioners would clearly be very different if they all settled in the same community than if they were more widely distributed. Thus, to each point on a demand curve there corresponds some assumption as to the distribution of the relevant number of practitioners. Clearly, the realistic assumption to make is that the choice of location is made by the new practitioners themselves. This, in turn, would presumably mean distributions of practitioners similar to the existing distribution.

c *The 'equilibrium' difference*

The preceding discussion of the nature of the supply and demand curves on which our analysis is based runs in terms of each profession taken separately. Couched in terms of absolute average incomes and absolute number of practitioners, the rough scheme presented is designed to determine the equilibrium level of average income in each profession. Since we were concerned solely with a comparison between medicine and dentistry, we did not actually employ such curves. Rather, for convenience, we used a supply curve and a demand curve that related to the two professions combined. This we did by the device of using, as the ordinate (see figure), the ratio of the average income



of physicians to that of dentists, and, as the abscissa, the ratio of the number of physicians to the number of dentists. For the demand curve (DD) the latter ratio related to the total numbers of practitioners. For the supply curve (SS) it related to the total number of applicants. The illustrative figure which presents these curves conceals a not unimportant detail. In order to make the two curves comparable, the scale used along the abscissa for the supply curve must be related in a special way to that used for the demand curve. The distance from the origin to any point on the abscissa must measure: (1) the ratio of all physicians to all dentists; (2) the ratio of medical applicants to dental applicants that is needed in order to maintain ratio (1). Thus, suppose that to maintain a ratio of 2:1 between all physicians and all dentists would require—because of differences in age distribution or for other reasons—two and a half times as many applicants for medicine as for dentistry. Then, the same distance along the abscissa should represent 2:1 for the demand curve and 2.5:1 for the supply curve.

If the curves are drawn in this fashion the ordinate of the point of intersection represents the 'equilibrium' ratio of incomes. Our upper estimate of this ordinate is 1.17; our upper estimate of the corresponding abscissa is 3:1.

As indicated in footnote 29, the use of such curves is somewhat inexact, although the fundamental conclusions would not be altered by using separate demand and supply curves for each profession. The difficulty with the latter procedure is that one of the 'other things' about which an assumption must be made in drawing the supply curve for one profession is the average income in the other profession. This assumption is of crucial importance for the problem of the relation between incomes in the two professions. It would have to be treated by considering the shifts in the curve for each profession resulting from changes in the income in the other profession, or, more simply, by introducing the income in the other profession as an additional variable. The procedure we employ simplifies the analysis greatly.

The difference between our analysis and what, for want of a better name, we have called the orthodox analysis has an important bearing on the nature of the problem to be studied. An analysis of professional incomes that concerned itself solely with the factors affecting 'price', i.e., with the type of supply and demand conditions outlined above, would be incomplete. In addition, an analysis is needed of the factors making for intra-professional differences in 'prices' or returns; i.e., of the factors making for variability of incomes. Section 7 above is devoted to an attempt to analyze these factors.

National Bureau Publications

A National Bureau volume has been selected for the 'Fifty Books of 1938' exhibition: *Capital Consumption and Adjustment,* by Solomon Fabricant (291 pp., $2.75). "The purpose of this exhibition is to show the fifty current books of the highest artistic and technical excellence, selected on the merits of physical attractiveness, suitability to purpose, and the success with which the designer has met the problems imposed by editorial content and conditions of production." After the opening at the New York Public Library on February 15 under the auspices of the American Institute of Graphic Arts one set of the books will be sent to the Golden Gate San Francisco Exposition; a second set will be sent to England, and a third will travel throughout the United States to meet requests for the exhibition.

The Bulletin

Subscribers will please note that this issue of the *Bulletin* bears two numbers—72-73; in other words, with this issue the 1938 series is completed. In the hope that subscribers whose term expires upon receipt of *Bulletin 72* will return