National Bureau of Economic Research

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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 Voluntary Consumer Credit; Analysis of Costs in Individual Enterprises; Cyclical Fluctuations in the Prices and Production of Specified Commodities; Manufacturing Production and Productivity; Differentials in Housing Costs; Capital Formation in Post-War Business Cycles.

Commodity Flow and Capital Formation, by Simon Kuznets (81 by 114.5, 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 doing 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 $20,603,000,000, 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 1925 to 1928, there was spent on their 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 editors of the Proceedings of the American Economic Association and 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.


Discussion: R. T. Bye, Gerhard Colm, M. A. Copeland, E. M. Martin

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, Gertrud Huber

Discussion: M. A. Copeland, Hans Neisser, Gottfried Huber

IV: Capitai Gains in Income Theory and Taxation Policy, Roy Blough and W. W. Hewett


Discussion: Simon Kuznets, G. C. Means; Lauchlin Currie and R. R. Nathan, concurrence

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

As noted in Bulletin 65, Volume One contained papers by M. A. Copeland, Carl Warburton, Solomon Fabricant, Simon Kuznets, Gerhard Colm, Carl Shoup, and Simon Kuznets. 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. 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. Some of these professions include the bulk of all independent professional practitioners. See National Income in the United States, 1929-1932, Statistical Data, U.S.A. (Washington, 1934), pp. 149-55, 204-5, 244-51. National Income of the United States, 1929-1937, Statistical Data, U.S.A. (Washington, 1934), pp. 149-55, 204-5, 244-51. National Income of the United States, 1929-1937, Statistical Data, U.S.A. (Washington, 1934), pp. 149-55, 204-5, 244-51.
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 sex, 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 practicing 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, 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 use any of our findings.

<table>
<thead>
<tr>
<th>Table 1: Nature of Sample Data Covered, Method of Selection, Number of Questionnaires Sent Out, Number Returned, Number Retained, Number of Usable Returns, and Percent of Usable Returns</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>Number of Returns</td>
</tr>
<tr>
<td>1939-42</td>
<td>10,000</td>
</tr>
<tr>
<td>1943-46</td>
<td>10,000</td>
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<tr>
<td>1947-49</td>
<td>10,000</td>
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<tr>
<td>1950-52</td>
<td>10,000</td>
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<tr>
<td>1953-55</td>
<td>10,000</td>
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<td>1956-58</td>
<td>10,000</td>
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<tr>
<td>1959-61</td>
<td>10,000</td>
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<td>1962-64</td>
<td>10,000</td>
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<tr>
<td>1965-67</td>
<td>10,000</td>
</tr>
<tr>
<td>1968-70</td>
<td>10,000</td>
</tr>
<tr>
<td>1971-73</td>
<td>10,000</td>
</tr>
<tr>
<td>1974-76</td>
<td>10,000</td>
</tr>
<tr>
<td>1977-79</td>
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<td>1980-82</td>
<td>10,000</td>
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<td>1983-85</td>
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<td>10,000</td>
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<td>10,000</td>
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<tr>
<td>1992-94</td>
<td>10,000</td>
</tr>
<tr>
<td>1995-97</td>
<td>10,000</td>
</tr>
<tr>
<td>1998-2000</td>
<td>10,000</td>
</tr>
<tr>
<td>2001-2003</td>
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<tr>
<td>2004-2006</td>
<td>10,000</td>
</tr>
<tr>
<td>2007-2009</td>
<td>10,000</td>
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<tr>
<td>2010-2012</td>
<td>10,000</td>
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<tr>
<td>2013-2015</td>
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<td>2016-2018</td>
<td>10,000</td>
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<tr>
<td>2019-2021</td>
<td>10,000</td>
</tr>
<tr>
<td>2022-2024</td>
<td>10,000</td>
</tr>
</tbody>
</table>

The table above shows the nature of the sample data covered, the method of selection, and the number of usable returns, with a percent of usable returns of 100.0 for all years.
National Bureau of Economic Research

Incomes from Independent Professional Practice

The lost 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—showed that the average income of dentists was not significantly related to the size of the sample employed by the Congress; the American Dental Association is approximately 30 per cent greater than that of non-members. The average incomes are not 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 was estimated as 15 per cent by Maurice Leven, The Incomes of Physicians (University of Chicago Press, 1932), p. 104.

These figures were provided by Marisal-Hollings-Beale. Although they were used in the 1956 directory of the American Dental Association to try to use the figures as given, since no count by states had been made for the 1937 directory. The figures used included 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.


The average cited 30 per cent as the difference in 1929 shown by his sample, which covered slightly over 5,500 dentists in 20 states. The averages for 1930 from the California study of 155 dentists per state and are 15 per cent for the 65 states.

These data were obtained in the expectation that the results would be used in a study of income. For this purpose it was hoped that they would reflect the income of dentists in each state to yield fairly reliable averages. Using the same sampling ratio for all states was beyond the scope of the sample than was feasible. Hence, a higher proportion of names was taken for the smaller states than for the larger.

Note that the changes in the sample for each state were adjusted for the size of community bias noted above before they were combined.

The 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. Laidlaw (American Journal of Public Health, American Medical Association, 1936, p. 17) gives the states number of doctors active 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 get the 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 weighing. In any event, there shown by our sample may thus be expected to be too high. Since our sample was representative of the American Dental Association, the estimates of incomes of dentists would be symmetric, the average income of dentists by states was about 30 per cent greater than that of non-members. In other words, the estimate from the California study than depends on the relation of the to and the relationship is between the limits set by the two extreme associations. In both these two extreme associations, the members appear to be somewhat of a mixture of the other two groups and thus might be expected to yield a figure closer to the 1936 figures, and 68 to 69.

The figure of 30 per cent selected for k implies, on the basis of the Leven's, that x is approximately 12 percent greater than x, and 17 percent below x. On the basis of the California figures, a k of 10 percent implies an x, 21 percent greater than x, and 13 percent below x.

The figure of 46 per cent is based on (unpublished figures supplied by the American Dental Association on the number of dentists in 1932 and 1934, and (2) estimates of the total number of dentists in the United States in 1932 and 1934. Figures for 1922 and 1934 were used because our samples were drawn from the names of dentists in 1932. The size of the sample of dentists in 1936. The latter 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 Census, XXV (January 1931), 151-60. Thomas gives 10,435 as the total number of dentists in the United States in 1932. We adjusted the second figure in two ways: we added 100 for New Mexico; and, second, we subtracted 4,560 to allow for the 1933 census which shows 11,320 for Illinois, whereas the 1930 Census gives 5,875. Our correction assumes that 4,500 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. In 1932 figures weighted nearer 4 and 3, the number of years to which the corresponding figures are adjusted. 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 implies that the same proportion of members and non-members are independent practitioners. There seems no way to check this assumption. However, some indication that the minimum error involved is provided by the fact that if we assume that all members are in independent practice, and use an estimate of the American Dental Association of the total number of dentists in independent practice (three estimates seem, if anything, slightly too low) than, using the figures given, we should have estimated that 37.5 per cent of independent practitioners were members and non-members would mean that the average income of dentists was 48.2 cents per member of alliance 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 dentists who are not members. 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 years is therefore naturally more feasible with the one member, 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 subject on other grounds, the averages yielded by the different samples for this group are close together (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 questionnaire 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 might be biased for the years before it would exclude those who had simultaneously 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 factors is to impart an upward bias to both the average income for the latest year and the trend of income over the period. And when the average is based on the earlier sample to give a higher average for an overlapping period.

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

Footnotes 11 and 12 indicate that the two figures on which the current estimate is based are believed to be roughly correct, but that there are selected from a range of possible values. It is therefore difficult to place any particular significance on the different values for the two basic figures. This is done in the following tabulation in which the values we actually used are underlined. The other then also remains underlined.
year. We have made no adjustment in the data to correct for this bias.

Comparison of the results of our samples with other studies on 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.

The relative standing of the other two professions

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, $2,830, 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 sample dentists 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 the incomes of consultants engineers and lawyers.

Table 2: Average Net Incomes, 1929-1936

<table>
<thead>
<tr>
<th>Profession</th>
<th>Sample 1929</th>
<th>Sample 1930</th>
<th>Sample 1931</th>
<th>Sample 1932</th>
<th>Sample 1933</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physicians</td>
<td>3,916</td>
<td>5,270</td>
<td>4,676</td>
<td>4,316</td>
<td>4,127</td>
</tr>
<tr>
<td>Dentists</td>
<td>5,493</td>
<td>4,875</td>
<td>4,199</td>
<td>3,615</td>
<td>2,903</td>
</tr>
<tr>
<td>Lawyers</td>
<td>3,508</td>
<td>3,096</td>
<td>2,744</td>
<td>2,503</td>
<td>2,609</td>
</tr>
<tr>
<td>CPA's</td>
<td>5,033</td>
<td>4,604</td>
<td>4,567</td>
<td>4,755</td>
<td>5,202</td>
</tr>
<tr>
<td>Consulting Engineers</td>
<td>3,721</td>
<td>4,721</td>
<td>4,216</td>
<td>1,836</td>
<td>4,274</td>
</tr>
</tbody>
</table>
| Number of Individuals Covered
| Physicians          | 2,229       | 2,229       | 2,229       | 2,229       | 2,229       |
| Lawyers             | 1,002       | 1,002       | 1,002       | 1,002       | 1,002       |
| CPA's               | 961         | 1,002       | 1,002       | 1,002       | 1,002       |
| Consulting Engineers| 481         | 481         | 471         | 471         | 471         |

4 Temporal Changes in the Average Levels of Income

Chart 1 suggests great similarity in the pattern of change in average incomes of 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 whether 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 latter legal sample is suspect. In addition, over half of the differences between the two 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.
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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)

<table>
<thead>
<tr>
<th>Year</th>
<th>1929</th>
<th>1930</th>
<th>1931</th>
<th>1932</th>
<th>1933</th>
<th>1934</th>
<th>1935</th>
<th>1936</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physicians (1)</td>
<td>100.0</td>
<td>69.4</td>
<td>77.1</td>
<td>58.0</td>
<td>55.5</td>
<td>61.4</td>
<td>65.0</td>
<td>72.9</td>
</tr>
<tr>
<td>Doctors (1)</td>
<td>100.0</td>
<td>93.9</td>
<td>88.2</td>
<td>59.2</td>
<td>52.2</td>
<td>57.2</td>
<td>62.2</td>
<td>72.2</td>
</tr>
<tr>
<td>Lawyers (2)</td>
<td>100.0</td>
<td>65.8</td>
<td>63.5</td>
<td>61.0</td>
<td>60.0</td>
<td>61.0</td>
<td>65.4</td>
<td>63.9</td>
</tr>
<tr>
<td>C.P.A.s (3)</td>
<td>100.0</td>
<td>92.3</td>
<td>76.6</td>
<td>60.2</td>
<td>54.1</td>
<td>61.0</td>
<td>63.9</td>
<td>69.9</td>
</tr>
<tr>
<td>Consulting Engineers (4)</td>
<td>100.0</td>
<td>84.5</td>
<td>69.2</td>
<td>26.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employers' compensation plus withdrawals of entrepreneurs per gainfully occupied workers (5)</td>
<td>100.0</td>
<td>90.0</td>
<td>75.9</td>
<td>59.7</td>
<td>58.0</td>
<td>64.0</td>
<td>68.8</td>
<td>76.8</td>
</tr>
</tbody>
</table>

1 1931 sample used for 1929-32; 1935 sample for 1933-36. 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 1931 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 relatives with 1935 as the base, as well as for each of the other professions.

2 1937 sample used for whole period 1929-36.

3 1935 sample used for 1929-32; 1937 sample used for 1933-36.

4 1936 sample used for 1929-32; 1937 sample used for 1933-36.

5 Estimates of employers' compensation and withdrawals of entrepreneurs for 1929-33 from Simon Kuznets, National Income and Capital Formation, 1929-1933 (National Bureau of Economic Research, 1937), pp. 33-64. Figures for 1934 and 1935 are the most recent estimates of net business income and withdrawals made by the Department of Commerce in its National Income series. The 1935 figure extrapolated on the basis of the relative increase from 1934 to 1935.

Incomes from Independent Professional Practice

Chart 2: INDEXES OF AVERAGE NET INCOMES FOR THE FIVE PROFESSIONS AND INDICES OF EMPLOYEES' COMPENSATION PLUS WITHDRAWALS OF ENTREPRENEURS PER GAINFULLY OCCUPIED WORKER

Per cent

<table>
<thead>
<tr>
<th>Year</th>
<th>Physicians</th>
<th>Dentists</th>
<th>Lawyers</th>
<th>C.P.A.s</th>
<th>Consulting engineers</th>
<th>Employers' compensation plus withdrawals of entrepreneurs per gainfully occupied workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1929</td>
<td>92.5</td>
<td>85.6</td>
<td>74.3</td>
<td>76.1</td>
<td>64.5</td>
<td>84.3</td>
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<tr>
<td>1930</td>
<td>85.0</td>
<td>88.0</td>
<td>73.9</td>
<td>73.9</td>
<td>66.6</td>
<td>88.0</td>
</tr>
<tr>
<td>1931</td>
<td>78.6</td>
<td>85.3</td>
<td>67.3</td>
<td>69.6</td>
<td>64.3</td>
<td>78.6</td>
</tr>
<tr>
<td>1932</td>
<td>71.4</td>
<td>82.4</td>
<td>64.3</td>
<td>62.9</td>
<td>65.5</td>
<td>71.4</td>
</tr>
<tr>
<td>1933</td>
<td>65.0</td>
<td>80.0</td>
<td>60.0</td>
<td>53.9</td>
<td>64.5</td>
<td>65.0</td>
</tr>
<tr>
<td>1934</td>
<td>58.0</td>
<td>77.4</td>
<td>55.0</td>
<td>50.9</td>
<td>64.5</td>
<td>58.0</td>
</tr>
<tr>
<td>1935</td>
<td>51.0</td>
<td>74.4</td>
<td>50.0</td>
<td>48.0</td>
<td>64.5</td>
<td>51.0</td>
</tr>
</tbody>
</table>

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

We may go somewhat farther in ascertaining 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 relative change in their average net income, assuming the period over 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 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 $5,500 for certified public accountants, $4,100 for physicians, and $3,500 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 depression 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 depression but rose more during the upswing. The average income of dentists seems to have declined relatively less 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

6 In combining the samples we resorted to averaging the results of the different samples by an inexact logical merit to this procedure. For reasons given above we support the 1929 figure from the later samples a downward bias, and hence that the best estimate of the current 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 in the country and auditors.

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 practice independently or as a salaried employee. The fore- going discussion is applicable to the same extent to the other professions and to the salaried as well as the independent group. Some considerations rise 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. Some considerations

Announcements of persons who are not certified are almost everywhere permitted to practice independently, although the proportion who do so is very much smaller than the corresponding proportion of certified persons.

| Table 4: Final Estimates of Average Net Incomes of Physicians and Certified Public Accountants, 1929-1936; Dentists, 1929-1934 | Average Net Income
|---------------------------------------------------------------|---------------
| 1929 | 1930 | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 | Average 1929-36 | Average 1923-38
| Certified Public Accountants | 7,154 | 6,609 | 5,840 | 4,108 | 3,908 | 4,364 | 4,527 | 4,092 | 5,152 | 5,180 |
| Physicians | 1,272 | 1,258 | 1,188 | 1,075 | 1,075 | 1,067 | 1,076 | 1,076 | 1,076 | 1,076 |
| Dentists | 617 | 630 | 579 | 540 | 554 | 621 | 643 | 627 | 681 | 625 |
| Average difference in average net income | | | | | | | | | | |
| C.P.A.'s and physicians | 5,882 | 5,257 | 4,762 | 3,708 | 3,733 | 3,788 | 3,759 | 3,726 | 3,852 | 3,805 |
| C.P.A.'s and dentists | | | | | | | | | | |

**Example:**

id, physicians and dentists as part of the broader "cura- tive" occupational group including the other as an alternativeness. To the extent that this may be done, it is possible that the differences in average incomes of the two groups might be expected to be considerably greater than the average in- come of other accountants. These differences are present in a minor extent with dentists and physicians, and are of virtually no importance for a comparison between the two. The proportion of all prac- titioners in salaried employment is small, probably well under 20 per cent, and is about the same for both men and women.

Their inclusion would thus affect the average income of either group but slightly and the difference between the averages even less. In addition, the data cover all types of practitioners—plus physicians—general practitioners as well as specialists—and both professions are sharply differentiated from other pursuits. It would, of course, be possible to con- sider similar considerations apply to the incomes of consulting en- gineers, who in 1930 numbered approximately 10,000 among 200,000 engineers.

We warn the reader in advance that we shall make a more elaborate comparison of the prospective pecuniary attractiveness of the four professions for both men and women than we suppose any young aspirant hesitating between medicine and dentistry actually makes in practice. Our laboration is designed to bring out clearly the numerous considerations that are log- ically 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 in- fluence 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 aid of statistical figures. As an initial step, we 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 be fallacious. The idea that might add that what holds true on the average for a consid- erable 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 itself felt in average in- come is the difference in period of training for the two professions. Typically, individuals beginning to practice medicine have had from eight to ten years of training after high school, and individuals beginning to practice dentistry, from five to seven. 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 shorter 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 in- come. An individual comparing the two professions must take into account the fact that if he chooses medicine each an- nual installment of income will be received three years later if he chooses dentistry. At an interest rate of 4 per cent per annum each installment of income from medicine would have the appearance of 1.25 times the corresponding installment from dentistry in order that the 'present value' of the two installments, at the time of making the decision, be equal. It is somewhat more diffi- cult 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 cited would be increased to 17 per cent; i.e., that to make the two professions equally attrac- tive financially (or actuarially) to the prospective practi- tioner, 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 in medicine may be questioned. As we have sug- gested, individuals choosing a profession with knowledge of costs and training for the mathematical train- ing needed to arrive at such an estimate; moreover, even possessing this knowledge, few would take the trouble to make an exact numerical calculation. The comparison and presentation of a figure with the aura of exactness possessed

of the period of training after high school required before admis- sion to practice in each of the four professions. What matters is the difference of 4.25 years or the over-all length of training shorter for dentistry than for medicine. However, the pre-dental curriculum, as far as it is measured with the corresponding portion of the pre-medical curriculum

*See especially section 1 of the Appendix.\]
by '17 per cent' may thus seem an attempt to force into a rigid and precise mold a process that is essentially vague and unpredictable. While few if any individuals go through the reasoning 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 all try 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. Effect of variability of incomes So far we have considered only what might be called the "pecuniary" aspect of the choice of a profession. Consequent-ly, we have been able only with the arithmetic average income 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 from the mean.

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 is also 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 exemplify the general pattern of high variability of incomes 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 median; 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 much below we are not in a position to say. Similarly, the nodal 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 to medicine precisely because the professional opportunities for both medicine and dentistry are greater than the opportunities for most other professions. The professional opportunities in both of these professions 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 disincentive that among the prospective practitioners themselves the gambling instinct is incomparably the stronger. If these observations are correct, then, it is to be expected that we lowered the arithmetic mean income of dentists by 17.4 per cent to correct for the bias due to the restriction of the samples to members of the American Dental Association. Whether the correction is 17.4 per cent higher or lower, medians are greater or less than this there seems no way of knowing.

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 month—a small sum, but a certain sum—than one which offered no certain income, and only an equal chance of affording only $200. Uncertainty, therefore, is not a faith which does not have its value, for even (11) 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 prices, 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 risk of being disappointed. An occupation depends more on the highest dentity 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 (6th ed., London, 1929), pp. 554-5.

That the present issue 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 our sample of a few incomes in medicine far greater than any reported in dentistry. 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 nonpecuniary 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 yielded a much higher income. Indeed, 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 that—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 incomes. Hence 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 the two professions. i.e., to maintain the existing ratio of incomes. Any given difference in average incomes, say 17 per cent, will appear greater to the physician who expects 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 ratio of physicians to dentists is about equal, then the ratio of incomes that would induce medicine to be the more attractive profession nonpecuniary factors would be greater than 17 per cent if the second ratio is smaller; if it is less than 17 per cent if the second ratio is greater than the first. 12

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 ratio of incomes the same. This theoretical statement is to some extent incorrect, since, under given conditions of demand, it is entirely possible for more than one ratio of incomes in medicine to dentistry to exist if the ratio of incomes, if the number of practitioners in the two professions combined varies. Exactness would have required phrases..."
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.°

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, and 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 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 supported by 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 5 on Restriction of entry.

6 Comparison of the difference in individual expected income with the observed difference in average income

The observed difference between the average incomes of dentists and physicians in the year 1929 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 difference, it is necessary to answer the following questions:

First, is the comparison statistically valid? Second, can the divergence be attributed to factors other than the 'equilibrium' difference? Before stating the answers to these questions, we shall briefly state the assumptions underlying our estimate of the 'equilibrium' difference. If these assumptions are not met, the difference may be an artifact and the conclusion that there is a difference in income between medicine and dentistry is not valid. The assumptions are, however, not unreasonable. Estimating the proportion of the variation in income due to differences in education between the two professions, we find that there is a significant difference in the proportions of individuals with college degrees who choose medicine or dentistry.

The relationship between the 'equilibrium' and the observed difference in income of dentists and physicians is thus a question of how accurately the observed difference reflects the equilibrium difference. The answer to this question depends on the extent to which the factors affecting the observed difference are related to those affecting the equilibrium difference.

The observed difference in income between medicine and dentistry, however, is not necessarily a result of the higher education required for medicine. Other factors, such as the higher prestige and status associated with medicine, may also contribute to the higher income of physicians. Therefore, we cannot conclude that the observed difference in income is solely a result of the higher education required for medicine.

The observed difference in income between medicine and dentistry is likely to be influenced by factors other than the 'equilibrium' difference, such as the higher prestige and status associated with medicine. Therefore, we cannot conclude that the observed difference in income is solely a result of the higher education required for medicine.
Limitation of the number of physicians dates from the first decade of this century. Initially it was an unannounced by-product of an intensive drive on the part of the medical profession for higher standards of medical education. The movement carried over into the number of medical schools unhesitatingly had a salutary influence on medical education and practice. During recent years, however, the limitation in the number admitted to medical schools has been maintained at a relatively steady level in order to make the number of applicants who are willing and able to meet the higher professional standards. "Too many are still unappreciated," says Harold Rynk, 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." It seems clear that such steps have succeeded to some extent in limiting entry.

(footnote concluded)

(And this cannot be estimated too strongly) it has definitely tended to lower the cost of medicine and lower the ethical standards of practice". In the second of the articles Biering writes, "And when one considers the inadequacy of physicians in this country he begins to appreciate what an effective task the AMA and its Council of Medical Education and Hospitals have done in cutting down the number of graduates of approved medical schools on this 'approved list' may take the extreme position that the sole reason for this resolution is to prevent so-called "overcrowding of the profession".

In conclusion, the Council on Medical Education of the American Medical Association has been more successful in restricting the number of attendances at medical schools than it has been in providing adequate medical education for the students they admit. And this is true of medical schools in all but three states, others legal requirements or the rules of the Board of Examiners specify that there are no legal requirements or the rules of the Board of Examiners specify that there are no legal requirements or the rules of the Board of Examiners specify that there are no legal requirements that delimit the number of students admitted to approved medical schools in those states. Late in 1935 or early in 1936 the Council on Medical Education issued a warning against the admission of larger classes than can be accommodated or than can reasonably be expected to satisfy approved scholastic standards. In announcing this warning the Council issued a statement: "We are being asked to provide for the numbers. The effect of the warning has been most beneficial. The number of students seeking admission has been reduced and the number of students admitted to approved medical schools has been decreased. The number of medical students has been decreased from a high of 65 per cent to a low of 35 per cent. These are based on figures given by Meyers, op. cit. to the effect that a large proportion of the applicants previously refused to be admitted to medical schools with relatively low percentages of refusal.

Other factors are the almost complete elimination of tuition fees for the maintenance of the schools and the consequent maintenance of a sufficient supply of well qualified students. Unless this tendency is overthrown the worst results, inevitably, a lowering of the standards of medical education and practice. 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 average income from tuition fees for the maintenance of the schools. The study showed that about a total income of approximately $12 million, or 5 per cent of the total income, is derived from tuition fees. It is unlikely that this situation has changed drastically in the last ten years. See Final Report of the Commission on Medical Education, W. C. Rayleigh, Director of the study (New York, 1934), p. 285.

6 Characteristics of the Frequency Distributions of Net Income for the First Profession

The average levels of net income and their changes over time tell us much about the income status of the different professions. When the Council was created . . . the factors that caused such a decline are evident in all observable records. The most important factor is the reduction of the number of approved medical schools. The reduction of the number of approved schools has been accompanied by a decrease in the number of medical students admitted to those schools. The reduction of the number of medical students has been accompanied by a decrease in the number of medical schools. The reduction of the number of medical schools has been accompanied by a decrease in the number of medical students admitted to those schools.

There are available the data on the number of approved medical schools and the number of medical students admitted to those schools. These data are published by the American Medical Association. The data show that the number of approved medical schools decreased from a high of 73 in 1930 to a low of 41 in 1935. The number of medical students admitted to those schools decreased from a high of 6,815 in 1930 to a low of 4,170 in 1935. The decrease in the number of approved medical schools and the number of medical students admitted to those schools has been accompanied by a decrease in the number of medical schools. The decrease in the number of medical schools has been accompanied by a decrease in the number of medical students admitted to those schools.

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National Bureau of Economic Research

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. In fact, it somewhat decreased the frequency distributions. For a firm we know only the total income. In obtaining frequency distributions we must perform to divide this total by the number of firm members and attribute this average amount to each firm member. In 1934 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 material entailed by its analysis, but also because, for reasons noted above, its reliability is peculiarly suspect.

In general form the frequency distributions for the different professions, 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 '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 nature 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?

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 in frequency distributions, there has as yet been found no formula that describes them adequately.

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 a size of community bias as well.
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 that 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 these 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 greater 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 others, two. An interesting fact brought out by the chart is that skewness is relatively greater in incomes from law than from 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 samples, but it seems doubtful that correction of the bias would reverse it.

So far as temporal changes are concerned, there appears to be a general tendency for absolute dispersion to decrease from 1929 to 1935 and to increase from 1935 to 1936, i.e., to vary in the same direction as the mean income. The decrease is considerably more marked than the subsequent increase in dispersion is by no means unmeant.

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 confirm 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. 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; accounting; 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. 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.

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, arranged 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

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

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<tr>
<th>Year</th>
<th>1929</th>
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*Note: The figure for dentists is corrected for the bias due to the restriction of the dental samples to members of the American Dental Association.*
Incomes from Independent Professional Practice

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 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 1901), pp. 209-219).

Chart 5
MEASURES OF RELATIVE DISPERSION OF INCOMES
THE RELATIVE INTERQUARTILE RANGE AND THE COEFFICIENT OF VARIATION

In Chart 6 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 curve suggests 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-quarters 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 sizes 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 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 cases more homogeneous samples of the various professions. This we do not attempt in this bulletin. Our conclusion, therefore, is 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.
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 to judge its quality objectively.

Enormous differences in what the individualiks—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 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 the demand for a given 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 that there will be an 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 number 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 a complete identity of the training and innate technical ability of all practitioners would reduce but little the variation in what consumers consider 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 unethicial.

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 professionals that we have almost exclusively the financial consumer. There would probably be general agreement that judgments concerning the quality of the services rendered vary somewhat less for dentistry than for medicine; for medicine; for which the demand 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 responsive to a profit motive to supply the demand. When the consumer is largely individual, it is unnecessary for the dentist to supply the demand to a new undertaking, different in nature from preceding ones. Their services are seldom required periodically. Thus, not only is there greater intrinsic variety in the type of work they perform; but the purchasers of dental service are not so closely tied to a new 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 practitioners; that is, the costs incident to an erroneous choice are greater. And, thus, presumably, exert a very much greater diversity of incomes among consulting engineers than among accountants.

Law, the one profession we cover that serves to a significant extent both private and public, is just the opposite. The professions, for this reason exceedingly difficult to compare with any of the other professions. If lawyers catered exclusively to eliminate consumers we might expect a priori their incomes to be considered different—far different from 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 is frequently more likely to obtain a clearer idea of his client’s case than than the quality of the dentist’s; though less clearly, this is probably 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 far less unequal than legal services, while less regular and periodically standardized as accountants’ services, are probably more so than those rendered by 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 doctors 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 applicable to an understanding of the economic status of independent professional practitioners. The latter would require consideration of the total income of individuals from all families, regardless of only a limited portion of their incomes. The restriction would not be serious were it possible to pass easily from conclusions regarding incomes from independent practice to conclusions relating to total income. This is not the case. Whether the variability of total incomes will be greater or smaller 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 less fortunate also in their subsidiary positions, 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
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board and lodging, clothing, etc. This restriction of costs to tuition fees from professional education, 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 what is termed the period of 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 in an "occupational expenses" rather than for professional 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 computing the dentist's series of expected future 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 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.4 The cost of the period, either one or two years, is one professional training for the dental student and of pre-professional training for the medical student. This cost is to be divided among the four dentists and the four medical students. 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, $550 for the second, and zero for the third. The first figures for the two years are approximately equal to those given by Leland for "Tuition and Fees" and "Medical Books, Instruments, etc." for the third and fourth year of medical school respectively. The last of those three extra years is typically the year of internship. Ordinarily an intern receives at least his room and board and occasionally a modest stipend. The cost of these extra years certainly more than covers any extra professional costs. Logically, the excess should be regarded as a professional income item, equivalently balancing 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 Committee5 gives $1,872 as the average cost of equipping an office for 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 $960,000, the figure given by Harold F. Clark.6 It supposedly refers 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, the thirty years of practice at age 40 to 69 for physicians and to 45 years for dentists. These are the figures given by Clark7 and are the only ones that would be consistent with assumption (6). Clark's estimate of average working life assumes retirement only through death.8 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 can be 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 increased chance of death with age.

These deficiencies affect our results in three ways. Our esti-

APPENDIX

1 How the Effect of Difference in Length of Training is Estimated

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 in a length of training.

Let V be the present value of the returns in dentistry for all but the last three years of the dentist's working life; c = the present value of the extra costs incident to obtaining a medical education; k the interest rate at which future returns and costs are discounted. This is the rate implicit in the three present values just defined.

V, c, and k may be computed as of any date. For conven-

ience, 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 in the same number of years after beginning practice, a ratio

\[ r = \frac{V - c}{V} \]

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.9 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. To find 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

\[ R = \frac{y}{v} \]

The numerical values used in the computations are:

\[ V = 292,584 \quad k = 1.00 \]

\[ v = 2,316 \quad p = 0.90 \]

\[ c = 709 \quad y = 45 \]

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 the instalments of income entering into V

(2) 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.

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9 Op. cit., p. 48. The figure cited does not include the cost of equipment purchased while in dental school. This averaged approximately $300.


11 Ibid., pp. 43 and 79.

12 Ibid., pp. 46, 79, and 150.
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nate 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 al-

lowance 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 adjustment would balance, but we suspect that, on the whole, this deficiency tends to make our estimate of R too small. However, rough and approximate computations sug-
ggest 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 at $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 be-
tween 35 and 39 years.4 The restriction to general practi-
tioners probably tends to make this figure too low. How-
ever, 89 per cent of Leven's sample were general practi-
tioners. Moreover, this tendency is probably more than
counterbalanced by two other factors: first, the figure re-
lates 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 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 0.5. 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 our result is in the opposite direction, al-

though (7) probably does as well. Assuming an interest rate of 4 per cent, our estimate of 17 per cent would there-
fore 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 den-

4 The Practice of Dentistry, p. 125.

4 From the point of view of the argument in Section 5 above, an adjustment of the rate of discount to do this would be strong enough to be an adjustment of the type of excess in the average return of dentists relative to that of physicians, i.e., the conclusions we draw would be strengthened if the correct figure were below the one we use.

nitions which would make the two professions equally attrac-
tive financially to a prospective practitioner.

Changes in the interest rate that is assumed would affect the result considerably. The absence of figures on the pres-
ent value of life earnings based on any other rate makes it dif-
ficult to derive any estimate 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 income stream for three years. This is $1,200 per annum for an interest rate of 4 per cent; $61 per cent for an interest rate of 2 per cent; and $91.4 per cent for an interest rate of 6 per cent. The total allowance would probably be about 11 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 in-
terest rate of 4 per cent is that this is 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, the choice 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 any sort, or another, we ordinarily think 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.

In the present instance we have attempted to allow for the various possible types of uncertainty directly rather than

4 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 the element 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 un-

certainty is itself a deterrent or attracting factor; the interest rate should be raised if it is a deterrent or 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 quantitatively measured stream increased or reduced by itself, even if we knew the items underlying the computation of the expected income stream, namely, the difference between annual earnings considered as of pos-
sibility and the probability attached to each. The allowance to be made will depend as well on the number of different investments in the case of an individual—or on the number on which there is independence among the various investments with respect to the probabilities attached to the different possible returns from each. The greater the degree of investment, the greater the degree of diversification of risk, and the smaller the degree of uncertainty attached to the investments viewed as a whole.

through the medium of the interest rate. The uncertainty arises both from the variable income in section 2(b) the uncertainty of the degree is but another aspect of variance of incomes. The uncertainty arising from vari-

ability of length of life we consider in assumption (7) short. The uncertainty arising from temporal variability of incomes is relevant only so far as it is medical 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 alter-

native possibilities 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 'advisable' interest rate but rather, if anything, too high.

2. Demand and Supply Curves for Professional Services

The analysis in section 5 implicitly uses concepts of de-

mand and supply that differ somewhat from those ordinar-
ily employed. For this reason it is important to describe these concepts explicitly.

In orthodox analysis the quantities demanded and sup-
plied 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 ser-

vices, however, it is not obvious even what the relevant unit of service supplied or demanded. 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 indi-

vidual stands ready to offer depends but little on the 'price' he can secure, although, of course, the quantity he actually renders doubles 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 practitio-

ners is little if at all affected by the current economic situation. In periods of depression, many, indeed leave the medical or dental profession to take up other pursuits; death and voluntary retirement are the principal reasons why indi-

viduals are not reproducible in sufficient numbers. Conversely, the number enter-

ing the profession is determined largely by the number cur-

cently graduating from professional schools and passing the licensing examinations. Over longer periods, the number of withdrawals is likely to be less than the allowable flow, 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 seeking to enter it. Thus, over longer periods, economic factors affect the supply of service offered, i.e., the total number of prac-
titioners, primarily through their effect on the number who seek to enter the profession.

The 'price' that determines the 'supply' of entrants is clearly the income or returns that individuals count on re-

ceiving. But this 'price' is not a single figure. Incomes re-

ceived differ greatly as between communities and types of practice. Moreover, for any particular community and type of practice, individuals recognize that the return they re-

ceive may vary widely between exceedingly wide limits, and, in-

deed, the degree of variation conceived of as likely is one of the factors affecting their decisions. Under these condi-

tions, 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 at first. In order to draw any supply (or demand) curve it is necessary to make assump-
tions—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 ex-

pected probability distribution of returns—both between and within communities—will have to 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 a function of the expected mean income corresponds to a particular struct-

ure of the probability distribution. Further, the fact that the supply curve must be derived on 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 income remain constant; we then attempt to evaluate the 'shift' in these curves that results from the existing differences in these

This statement assumes of course, relatively free entry. If the number permitted to enter is fixed, then the supply of practitio-

ners will be almost completely independent of the economic fac-
tors of the profession. We abstract from restriction of entry in our analysis of the 'supply curve' because the assump-
tion of determining the 'equilibrium' difference is to estimate the portion of the observed difference attributable to restriction of en-
try, and to do this we need to know what the actual differences would be were entry free.
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 effected 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 number of consumers 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 purpose. It is the average net rather than gross income that is relevant for 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 may therefore use 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 for medical care. In 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 thereby their income from 1.32 to 1.27 (see section 54 and footnote 30).

A demand curve of this type is, of course, not theoretic- ally determinate unless assumptions are made about the behavior of other things. In the present chapter, at least, the most important of these is the way in which the number of 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 are 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 distribution 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 destined 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 practitioners. The illustrative figure which presents these curves conceals a not unimportant defect. 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 2:1.5 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 each 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 and supply curves for each profession. 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 'price' or 'returns'; i.e., of the factors making for variability of incomes. Section 7 above is devoted to an attempt to analyze these factors.