SALARIES—A FRAMEWORK FOR THE STUDY OF TRENDS

BY FRED G. BERGHOEFER*

This paper proposes that salary structures and the development of salaries over time be considered within the framework of the distribution of income over time. In particular, it examines certain salary scales in the U.S. and the progressions of typical individuals' salaries during the period 1948–1969, in comparison with the percentile distributions of household income in the same period, as reflected by the Current Population Survey of the Bureau of the Census.

INTRODUCTION

This paper, which might also have been subtitled "On Keeping Up with the Joneses," proposes that salary structures—and especially starting salaries for particular grades of employees working within established salary schedules—be considered within a framework of national percentile distributions of personal income. These distributions, which are readily available [1, 2], merge inflationary and increased productivity trends and other social adjustments. Curves for these distributions are presented here, and salary scales for Arlington County, Virginia, schoolteachers and the U.S. Civil Service are examined within this framework. Starting salaries for engineering graduates are also set in this context. The trends since 1948 are discussed and, for those organizations with virtually fixed salary increments or promotions such as schoolteachers, the progressions of typical individuals' salaries during 1948–1969 are compared with national percentile distributions.

THE PERCENTILE FRAMEWORK

The basic data used in preparing the changing percentile distribution of income since 1947 are presented in Table No. 13 of reference [2]. The results were reworked and curves for the 10, 25, 50, 75, 90, and 95th percentiles are presented in Figure 1.

In the discussions that follow, it should be kept in mind that this framework is for household income of primary families (related individuals in a single household) or for single individuals constituting a household, and not for individual income. Consideration was given to the use of individual rather than household income, but it was decided that household income is more generally relevant for looking at relative affluence. Therefore, the figures present curves of salary schedules of individuals plotted in a framework of household income.

Accordingly, the relative position is correct only for those households having only one income producer. If there are other wage earners in the household, total household income must be combined before the household's relative

*A division director of the Operations Evaluation Group of the Center for Naval Analyses, an affiliate of the University of Rochester, Arlington, Virginia.

position can be determined. The comparisons made here thus reflect the position of a household that depends only on income from the wage earner discussed. While this may in general indicate too low a position for such households (since in some cases they will have more than one wage earner), it is considered to be an appropriate framework for a study of individual salaries.

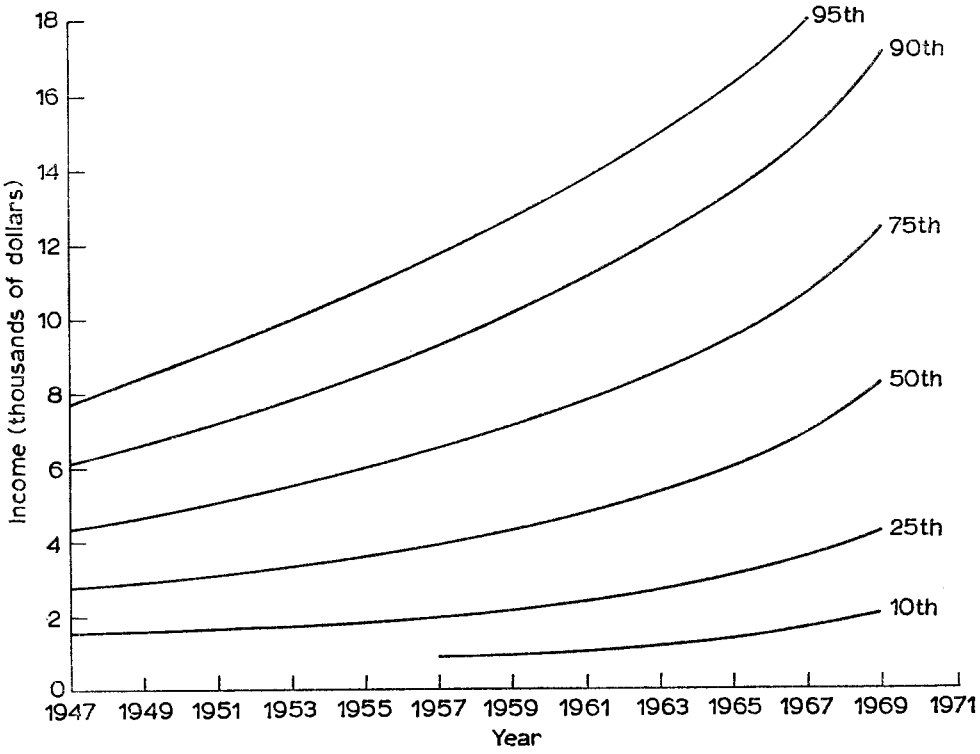

Figure 1. Primary Families and Individuals Total Money Income by Percentiles.

Figure 1 shows a remarkable stability in distribution of income between 1947 and 1969. The income of a household at the 10th percentile level has increased during that time at only a slightly higher rate than the income of a household at the 75th percentile. There is some indication that the rate of increase for the 90 and 95th percentiles is somewhat lower, but the difference is not marked. The average annual increases that would have resulted in equivalent changes from 1947 to 1969 are shown in Table 1.

While there has been little redistribution of income among the population considered, all groups have increased in affluence during this time period relative to the consumer price index. While the median income for households went up an average of about 4.9 percent per year between 1947 and 1968, the consumer price index rose an average of 2.1 percent per year from 1947 to 1968 [1]. Over this 21-year period, such annual rates of change accumulate to a total increase of 170 percent in income, compared with an increase of 55 percent in the consumer price index.

TABLE 1

AVERAGE ANNUAL INCREASE IN INCOME FOR HOUSEHOLDS
(1947 to 1969)

Percentile	*Average Annual Change*
10	0.057*
25	0.046
50	0.050
75	0.049
90	0.047
95	0.043**

*1957–1969.
**1947–1967.

COMPARISON OF VARIOUS SALARY SCHEDULES WITH THE BASIC FRAMEWORK

In this section, two aspects of salaries are compared with the basic percentile distribution framework. Salaries for particular grades of employees are overlaid on the basic curves and, in addition, salary traces of typical individuals are overlaid on the basic curves. Thus for Arlington County schoolteachers, for example, the overlays show how starting salaries for teachers with bachelors' degrees and no experience compare with the national percentile distributions, and also show how a teacher starting to teach in some particular year has fared compared with the national percentile framework.

Arlington County, Virginia, Schoolteachers

The overlay of the Arlington County schoolteacher salary schedules [3] since 1947 is shown in Figure 2. Here, five salary curves are overlaid on the basic percentile curves. The lowest solid curve shows how the starting salary for a teacher with no experience and with a bachelor's degree has changed since 1947. Similarly, the upper dashed curve shows the top salary available to a teacher with a master's degree who remains in classroom work. Finally, three dashed curves show the salary traces for teachers with bachelors' degrees who started teaching in 1947–1948, 1951–1952, and 1959–1960.

This figure shows that since 1947, starting salaries for Arlington County schoolteachers have remained remarkably stable relative to the national percentile distribution. Throughout the period, individuals with bachelors' degrees started teaching with an income that placed them at about the 40th percentile. Top salaries for teachers with masters' degrees similarly exhibit stability compared with the national percentiles, having remained at or just below the 75th percentile. The separation between master's-degree-career and basic salaries from 1963 to 1968 stems from a salary structure that was initiated in 1964 and abandoned in 1968.

The three traces for typical teachers with bachelors' degrees who joined the Arlington system in different years show these teachers progressed from the 40th percentile when they started to about the 70th percentile. Note that existence

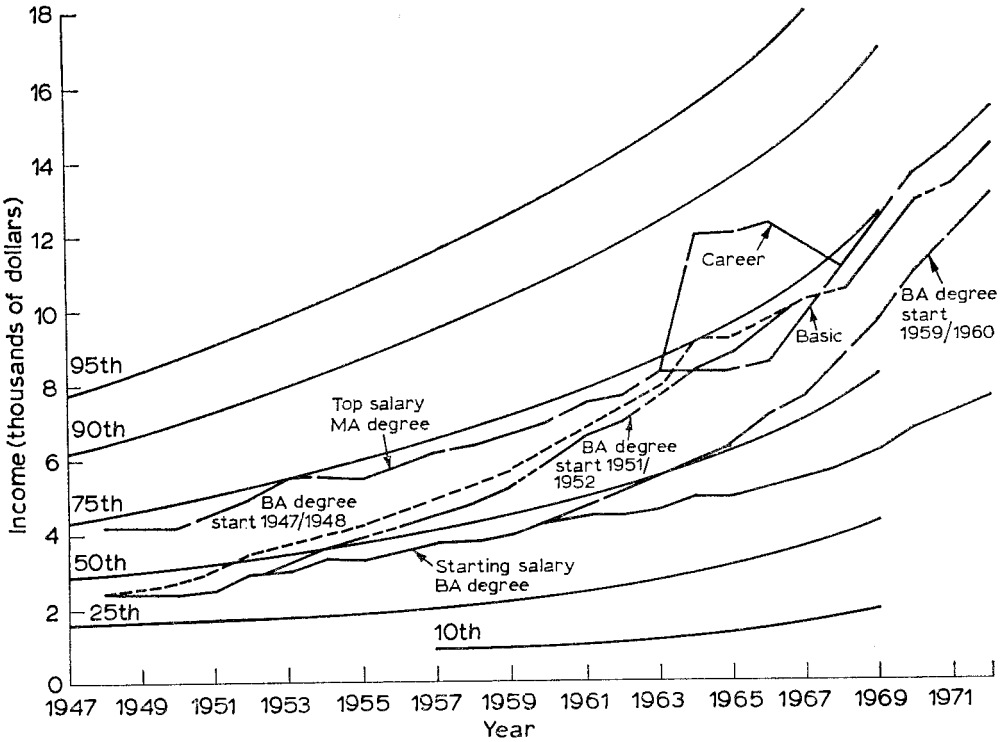

Figure 2. Arlington County Teachers Salaries Overlaid on Primary Families and Individuals Total Money Income by Percentiles.

of a top salary for the class of teacher means that an individual who started teaching in 1951–1952 has "caught up" after 12 years (when he reached the top salary grade) with one who started teaching four years earlier. (It now takes about 14 years to reach the top salary grade, as some additional salary steps have been added since 1963–1964.) Not shown are modest longevity increments for 20, 25, 30, and 35 years of creditable service.

U.S. Civil Service

Figure 3 presents the curves of base salaries for U.S. Civil Service grades GS-5, 9, 12, and 15 overlaid on the percentile curves. The Civil Service salaries exhibit a trend that is not present for the schoolteacher salaries. Over the entire period, Civil Service salaries have declined relative to the percentile traces. (There are indications of an upturn in recent years, however, as discussed later.) For example, the GS-9 base salary was at the 75th percentile in 1950 but, by 1969, had declined to about the 55th percentile. For the GS grades shown in Figure 3, the approximate percentile positions in 1950 and 1969 are shown in Table 2.

Therefore, a household that depended only on the salary of an individual who maintained a single grade throughout this period would have fallen behind in income relative to the entire population of U.S. households (in-grade increases excluded). There are, however, indications that there has been some grade

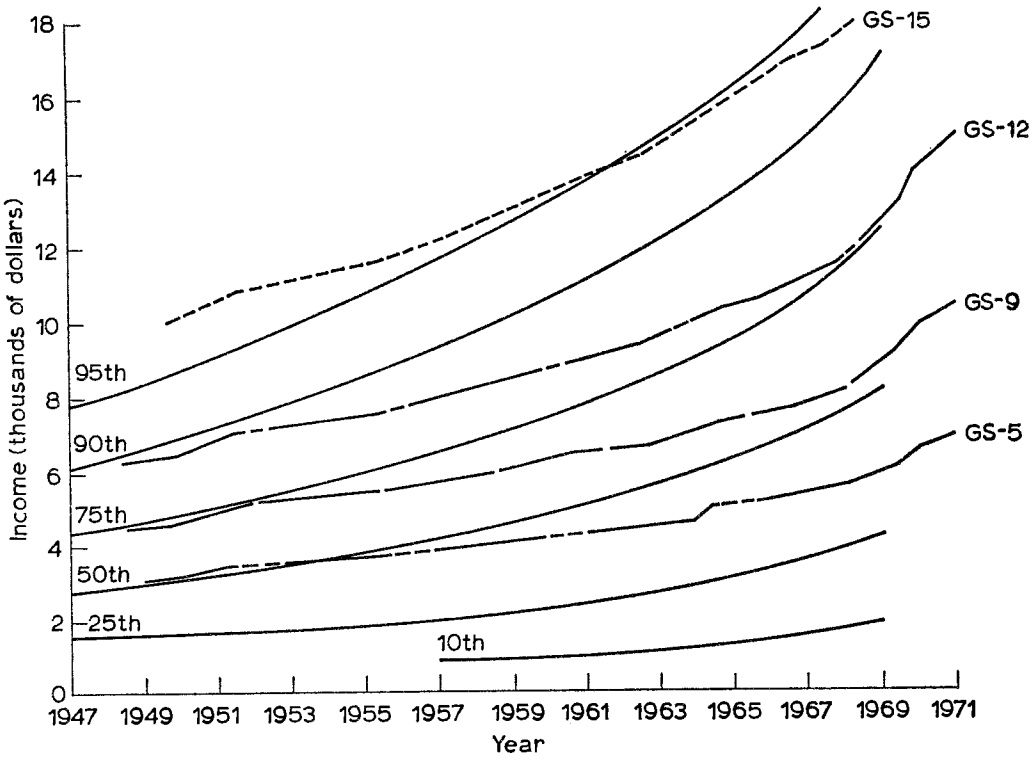

Figure 3. U.S. Civil Service Salaries Overlaid on Primary Families and Individuals total Money Income by Percentiles

TABLE 2

PERCENTILE POSITION OF VARIOUS U.S. CIVIL SERVICE GRADES 1950 AND 1969

Civil Service Grade	*Percentile Position* 1950	1969
GS-5	50	35
GS-9	75	55
GS-12	90	75
GS-15	Above 90	Below 90

"inflation" during the period under consideration, with individuals in a higher grade now undertaking tasks previously assigned to persons in a lower grade; these aspects are not dealt with here. The effects of substantial Civil Service salary increases, beginning about 1968, to achieve "comparability" with private employment show clearly in the upturn at the right side of Figure 3.

Engineering and Scientific Salaries

Similar curves for BS engineering starting salaries and for starting salaries for physics and mathematics PhD's [4] are shown in Figure 4. This set of curves

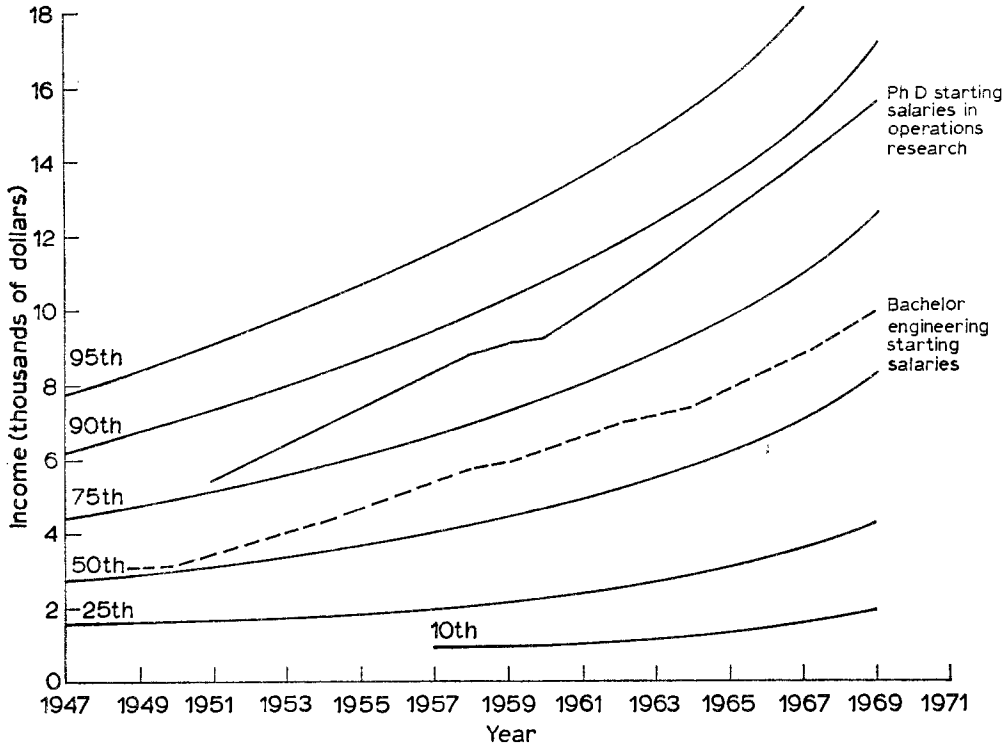

Figure 4. Engineering Starting Salaries and PhD Salaries in Operations Research Overlaid on Primary Families and Individuals Total Money Income by Percentiles.

exhibits a performance rather startlingly different from that for the teachers and civil servants. Where those schedules tended to be relatively constant or falling compared with the national percentile distributions, the engineering starting salaries rose from the 50th percentile in 1947 to about the 60th percentile by 1969. The PhD starting salaries rose from about the 80th percentile in 1951 to about the 85th percentile by 1969. This presentation thus makes clear the relative salary gains achieved by scientific and technical professionals since the late 1940's.

Discussion

It should be emphasized that the distribution of household income shown in Figure 1 is for the entire U.S. population. One factor that has been at work throughout this period has been the increasing frequency of working wives. In 1950, approximately 24 percent of wives were working. By 1968, 38 percent of all wives were working [1]. This factor alone would clearly tend to increase household income over the period.

When a wife goes to work for the first time, the household takes a step up in relative affluence. Later, as wives from more and more households go to work,

the position of the household where the wife started working earlier will obviously fall in relative affluence. For the stable household, with either one income producer or with both husband and wife working throughout the period, income would have had to increase at least as much as shown in Figure 1. Otherwise, the family would have fallen in relative affluence during this period.

Nothing in these figures should be used to adduce socially desirable salary trends during the period covered. Only the trends as they occurred are reported. Whether schoolteachers' salaries should have advanced more, the same, or less than household income is a question that cannot be answered by the information presented. The curves show only that schoolteachers did maintain their position of relative affluence during this period, not whether that should have happened. The latter involves questions of supply and demand, teachers and school-system salary negotiations, and social considerations such as what salary level is appropriate for the schoolteacher. These considerations have been deliberately ignored here to focus attention on the analysis of the trends without side discussion of social objectives. It is believed, however, that the percentile distribution of household income may provide a useful framework within which to discuss such social objectives as "desirable" salary schedules for particular working groups.

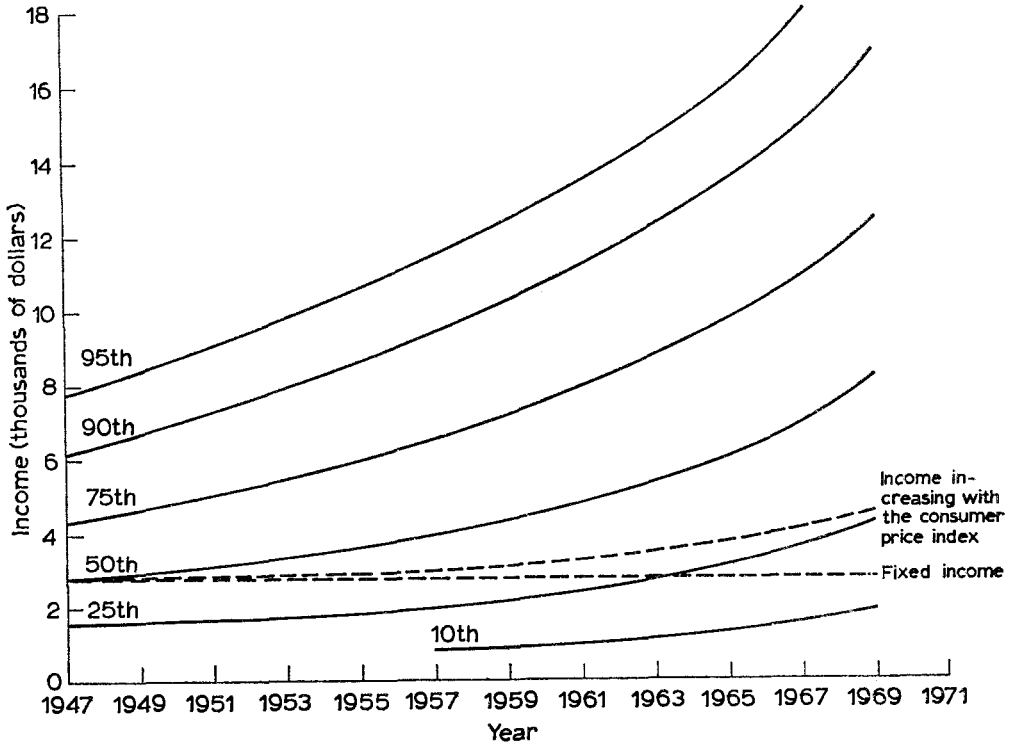

Figure 5. Fixed Income and Income Increasing as the Consumer Price Index Overlaid on Primary Families and Individuals Total Money Income by Percentiles.

As a final application of the relative affluence framework, Figure 5 shows (dashed) traces for two households, both starting at the 50th percentile point in 1947. A fixed income is shown for one household; for the other, an income that increased as the consumer price index increased is shown. The fixed-income household had dropped from the 50th percentile position in 1947 to about a 16th percentile position in 1969! The family with an income that increased annually at the same rate as the consumer price index dropped from the 50th percentile position in 1947 to about the 27th percentile position by 1968. Clearly, such families have not maintained their positions of relative affluence during this period. Expressed in this framework, their decline in relative affluence has been severe indeed.

Summary

The percentile distribution of income of households in the U.S. is presented and is thought to offer a useful framework within which salary structures may be examined. Historic trends for this distribution of household income include the effects of inflation, changes in productivity, and the increasing frequency of working wives.

By plotting salaries of particular grades of employees against such a framework, it can readily be determined whether the income of households depending on these salaries is moving ahead, staying even, or falling behind the income of other households in the nation. For this reason, the framework may be useful in illuminating salary negotiations and providing a basis for resolving whether salaries are keeping up or falling behind. This is often a key issue in such negotiations, and concentration on "cost-of-living" increases based on the consumer price index will neglect other effects that also cause salaries to increase. For example, between 1947 and 1969, household income went up an average of about 4.7 percent per year for all the percentile groups considered, while the consumer price index went up an average of only 2.7 percent per year from 1945 to 1963. In setting guidelines for wage increases, it might thus be more desirable to be guided by changes in median income than cost-of-living increases if the objective were to maintain relative affluence, which might be viewed as a reasonable objective.

Starting schoolteachers' salaries in Arlington County, Virginia, were remarkably stable in the percentile distribution framework from 1947 to 1969. U.S. Civil Service salaries declined in this framework. During the same period, starting salaries of engineers with BS degrees and physicists and mathematicians with PhD's have moved up about 5–10 percentile points in the national distribution.

References

[1] Statistical Abstract of the United States.
[2] Current Population Reports, Consumer Income, U.S. Department of Commerce/Bureau of the Census, Series P-60, No. 75, December 14, 1970.
[3] This historical information was made available by Mrs. Gordon of the Personnel Department of the Arlington County, Virginia, Public Schools.
[4] College Placement Council, Study of Beginning Officers.