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Introduction

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The 1956 Conference on Research in Income and Wealth dealt with the nature, reliability, and utilization of income data included in the decennial census of population of 1950. The Executive Committee hoped that such a discussion might prove helpful in formulating the income questions in the census of 1960 and in planning the tabulations to be published.

It could not have been the purpose of the Conference to formulate specific suggestions. Instead, it undertook a review of the various studies undertaken to evaluate the statistical quality of the 1950 census income data and an appraisal of their analytical usefulness against the background of similar data available from other sources, including the annual distributions from the Current Population Reports of the Bureau of the Census.

The program of the Conference, held in March 1956, was organized around studies conducted at the request of the Bureau of the Census as a series of cooperative projects involving several agencies. Their object was to match income information from the individual schedules of the 1950 census of population with income data from other sources, including field surveys of other organizations (Survey of Consumer Finances), administrative records (personal income returns of the Internal Revenue Service and wage records of the Bureau of Old-Age and Survivors' Insurance), and a special field survey conducted by the Bureau of the Census itself (the Post-Enumeration Survey) four to six months after the original census was taken.

The matching studies involved a considerable expense of time and money. However, at the time the Conference was planned, no comprehensive reports on any of them were generally available. Several of the key technicians had, in the meantime, left the agencies on behalf of which they had cooperated on these projects. The Conference was designed to help organize the results of the studies and make them available to technicians outside the agencies involved.

Part II of the present volume includes reports on the matching studies. These studies were all initially conceived as integral parts of the Post-Enumeration Survey. The "Census Quality Check" referred to in the paper by Monroe G. Sirken, E. Scott Maynes, and

John A. Frechtling involved the use of the questionnaires, techniques, field organization, and interviewers of the Post-Enumeration Survey in a re-interview of half of the sample employed in the Survey of Consumer Finances. The paper by B. J. Mandel, Irwin Wolkstein, and Marie M. Delaney describes the use of a subsample of the Post-Enumeration Survey sample. The paper by Herman P. Miller and Leon R. Paley refers to still a different subsample of the Post-Enumeration Survey, one for which data collected in the 1950 census were compared with data on income tax returns. Finally, the paper by Leon Pritzker and Alfred Sands discusses the results of the major component of the Post-Enumeration Survey—the "re-enumerative check." A report on the 1949 Audit Control Program of the Treasury Department is also included because the Program Committee thought that a study on the reliability of income data obtained from mandatory reports and involving a penalty for under-reporting would shed light on the quality and limitations of income data collected through the census questionnaire.

Another group of papers deals with substantive findings based on income data, since the most significant appraisal of a body of statistical data must emerge from its actual use in economic and statistical analysis. Part III, therefore, includes several papers using census data analytically. In view of the limited number of projects from which an appraisal of census income distribution data for specific population groups could be obtained for the Conference, the Program Committee did not hesitate to include an analytical paper based on budget data collected by the Bureau of Labor Statistics in the same year.

To give the Conference a proper perspective, three papers of a more general nature were scheduled. In Part I, the first paper surveys some of the frontiers of size-distribution research, thus relating the Conference proceedings to the two earlier conferences on income distribution held in 1943 and 1951. Another establishes a bridge between the census data and other income data. And the third provides a general historical review of income questions in census surveys.

In planning the Conference, the Program Committee had the wholehearted cooperation of the Bureau of the Census and of the various government agencies with which the authors of the several papers are or were associated. All those interested in income size distribution owe a debt of gratitude to the cooperating agencies, but first of all to the Bureau of the Census. Indeed, the initiation of the studies reported in Part II of this volume is an impressive testimonial to the scientific integrity and searching spirit of this veteran

of all government organizations concerned with the production of social and economic statistics.

The statistical problems—theoretical as well as operational—encountered in the matching, quality check, and audit programs surpass in interest and significance the limits of the specific projects in which they were encountered. Some of the material presented in Part II, therefore, will be of interest to all who use sample surveys as a tool for the obtaining of analytically significant distributions of economic variables.

The present Conference report differs from all preceding volumes in this series in that it contains a substantial number of statistical tables. Several census tabulations which otherwise would not become generally available, and all original data developed in connection with several of the papers, have been included. This wealth of statistical material—source data, comparative and cross-tabulations, and analytical tables—will, it is hoped, be welcomed by all those who are striving to translate a set of dry statistical records into a dynamic picture of our changing income distribution.

To help the reader in approaching so technical a volume as the present one, it seems useful to summarize here some of the results of the analyses presented in the papers and the related comments and identify some of the problems they raise. Since the authors of the papers were not restricted in the scope of their inquiries, some of the material presented goes far beyond the purely statistical problems that were at the origin of the matching studies around which the Conference program was built.

Indeed, when we probed into the statistical quality of census income data, the question, "How good for what purpose?" emerged immediately. And how good in comparison with what other income data? This question at once opened up the whole issue of the purpose and interpretation of income size distributions in general. From there, it was only a step to probing into the direction and significance of recent changes in size distributions, and to raising some broader questions on the implications and limitations of the personal income concepts now generally used.

The present volume thus takes its place among the several volumes of this series dealing with the broader aspects of the problem of the size distribution of income in the United States.[1] Like its

[1] Volumes Five, two parts (1943), Seven (1946), Nine (1948), Thirteen (1951), and Fifteen (1952) of Studies in Income and Wealth are devoted entirely to the question of size distributions of income. Relevant papers are also included in several other volumes, notably Three (1939), Eight (1946), and Ten (1947). (See list of publications of the Conference at the back of this volume.)

predecessors, it raises more questions than it answers. But, if past experience is a reliable guide, although some seeds take long to germinate, no issue that has been recognized as relevant has ever been permitted to sink into oblivion. The body of empirical data on income structure is in a fluid state. The greater the challenge, the greater the effort required to meet the ever widening needs for factual knowledge of and analytical insight into this vital aspect of economic change and growth.

In consonance with the plan of the Conference, it is proper to begin the summary with a review of the results of the quality check studies, and to pass from there to some more general statistical and analytical issues raised in the Conference reports and the ensuing discussions.

TESTS OF CONSISTENCY

With the exception of the Audit Control Programs (ACP) of the Treasury Department described by Marius Farioletti, the quality check studies reported on in Part II were undertaken to appraise the quality of the 1950 census income data,[2] not to validate the income distribution it showed, although Miller and Paley seem to take a contrary view (page 200). The appraisals involved comparing answers to income questions in the census with income information obtained independently for the same or "matching" income recipients. The purpose of the Post-Enumeration Survey (PES), according to Pritzker and Sands, was to evaluate the consistency of the replies to income and other questions in successive canvasses by the Census Bureau field staff and to assess improvements obtainable with higher quality interviews and respondents than those of the 1950 census. The survey methods employed by the Bureau of the Census, rather than the income distributions obtained in the 1950 census, were examined. Only the PES and the 1950 census–Internal Revenue Service (IRS) matching study, analyzed in the Miller-Paley paper, involved camparisons with the original census schedules. In the match with Old-Age and Survivors Insurance (OASI) records, the PES schedule was used; this is discussed in the paper by Mandel, Wolkstein, and Delaney. Sirken, Maynes, and Frechtling describe how a special subsample was taken within the

[2] The only important quality check study not reported at the Conference was the 1950 Census–Current Population Survey (CPS) study, the main results of which were already available by the time the Conference was being organized (see Herman P. Miller, "An Appraisal of the 1950 Census Income Data," *Journal of the American Statistical Association,* March 1953)

framework of the Census Quality Check (CQC) sample to study consistency with the Survey of Consumer Finances (SCF).

The schedule for the 1950 census included separate questions on three types of income: wages and salaries, income from self-employment, and income from sources other than earnings. The last catch-all category included property income, rents, and transfer income. For checking purposes only, separate information on nine items of income other than earnings was obtained in the PES schedule. Separate tabulations of persons and families with some income from each of the three major sources were used in the quality check studies. Except for the OASI–PES comparison, all the matching studies involved family units and unattached individuals. In the 1950 census–PES study, however, most comparisons are for persons (Pritzker-Sands, all tables except Tables 14 through 16).

The wide range of empirical data drawn upon in the various papers, together with the lack of a uniform plan of analysis, makes it impossible to cast the results of the matching studies into a uniform mold and to compare them directly. I therefore present merely some of the highlights, focusing, as the underlying studies did, on medians and variability.

In view of the more limited coverage of the IRS data and even more limited coverage of the OASI data, it is not surprising that comparatively few households or individuals could be matched with the census universe. Only about 12 per cent of the 12,000 OASI–PES schedules could be actually matched. Even in the CQC resurvey of part of the SCF sample, 25 per cent of the units could not be matched.

In spite of differences in collection techniques and failure to match a large, but varying, proportion of responding units, median incomes are rather close for all matched units combined as well as for broad subgroups, with the notable exception of farm incomes and of entrepreneurial incomes in general. For the matched schedules, differences between the medians were relatively small, ranging from $24 for all units (families and unattached individuals) in the CQC–SCF match to $77 for persons in the 1950 census–PES study. (No medians were computed for the OASI–PES comparison of wage income because of the various limitations involved.) The 1950 census–IRS comparison occupies an intermediate position, the difference in the medians amounting to $57 (and not exceeding 2 per cent at any given income level). However, the difference between the medians in the IRS and the 1950 census distributions is nearly doubled (increased to $100) when conceptual differences

are narrowed down by eliminating individuals reporting nontaxable income in the census. Furthermore, as Farioletti shows, incomes reported to the IRS were lower than those actually received: the full degree of underreporting is not revealed by comparing census reports with IRS returns.[3] The areas of largest underreporting revealed by the matching surveys—income of farmers and of self-employed and professional workers—are precisely where the ACP found the most significant failures to report taxable income.

In the case of CQC–SCF match, a comparison including all schedules, both matched and unmatched units, is of some interest because the CQC undertook a resurvey of about half of the original SCF sample. The medians of the two distributions are only $115 apart, and the largest difference in cumulative percentage distribution is only 2.3 percentage points. The chief explanation for the similarity of means is compensating errors (reporting and enumerative).

Several authors point out that underreporting is larger for families than for persons or one person families. The main reason for missing part of the family income was a failure to inquire about the income of each individual member of the family when obtaining family income data from its head (Pritzker-Sands, page 228; and Goldfield, page 57 ff.).

The response variation was very great for all matched samples even though fairly wide income class intervals were used; narrower intervals would have reduced the percentages of matches considerably. In the 1950 census–IRS match, only 40 to 45 per cent of all families were in the same class. In the 1950 census–PES match, about 60 per cent of the males and 75 per cent of the females fourteen years old or older were assigned to the same income interval. An even lower percentage of persons fourteen years old or older was found in the same income interval in a 1950 census–CPS match (61 per cent),[4] even though in this case the surveys were taken only a month apart and the wording of the questions was practically the same in both. In the CQC–SCF match also (Sirken-Maynes-Frechtling, Table 1), fewer than two-thirds of all consumer units reported income in the same income interval, although the interval used was twice as large ($1,000) as in the other matching studies. Interestingly enough, more women than men reported incomes in the same interval, in part because many more women than men reported no

[3] For the years 1944–1946, Selma F. Goldsmith estimated that tax returns underestimated income by about 14 per cent (see Volume Thirteen (1951) of Studies in Income and Wealth, p. 302).

[4] Miller, *op. cit.*, Table 4.

income. In the OASI–PES match, limited to wage and salary income of $3,000 or less, an identical income was reported by 45 per cent of the covered employees with one employer only; it can be estimated (from Charts 1 and 2 in the Mandel-Wolkstein-Delany paper) that in nearly two-thirds of all cases income reported would have fallen within the same census income interval.

On the whole, the results of the matching studies are consistent with a priori expectations; substantial failure to match units and great response differences are to be expected when matching income information from widely diverse sources. Yet the matching studies reported produced no conclusive results. Because of differences in definitions and technical limitations, it was in no case possible to stipulate in advance what degree of matching was to be expected. Nor are there, as Kaitz points out, any benchmarks to measure response errors (gross), even though there are ways to assess the magnitude of total underreporting (net). Miller and Paley stress that the similarity of over-all distributions masks important differences in their component parts. In analyzing the sources of error, which in their particular case happened largely to offset each other for both the matched and unmatched units, Sirken, Maynes, and Frechtling warn that this may not always be true.

Rather than constituting a validation of any of the distributions compared, the quality check studies contributed to an understanding of the differences among the various types of household surveys and between distributions obtained in such surveys and those derived from other sources. At the same time, they brought into relief the dependence of the results obtained on how the data were collected and processed and on how income, reporting unit, and time period were defined. Matching studies provide no answer on the general superiority of one survey technique over another; a higher reported income does not necessarily mean that a more valid report has been obtained. Indeed, as Goldfield and Grove point out, high incomes reported from self employment may be due to a confusion between gross and net income rather than to a more complete coverage.

UNDERREPORTING AND RESPONSE VARIABILITY

Much of the Conference discussion was concerned with two important weaknesses of income data from surveys—underreporting and response variability. Both are of particular significance for cross-sectional analyses for which decennial censuses and other survey data provide the income dimension.

Students of survey methods have long been aware of numerous

problems of underreporting and response variation involved in the collection of income data through interview methods. A significant amount of underreporting was revealed by the PES conducted by the Bureau of the Census upon completion of the 1950 census.[5] The PES uncovered nearly 1.7 million additional persons with income, reduced the percentage not reporting income from 6.7 to 2.5 per cent and the percentage reporting no money income from 35.4 to 31.7 per cent. And even though the median income of the additional units was lower than for those reporting in the census ($1,840 versus $1,917), aggregate income covered in the PES was 4.1 per cent higher than in the census. In particular, the census undercounted persons with income other than earnings and those in the highest brackets.

As Peter O. Steiner points out, a proportional understatement of income in all brackets may change the proportion shown in all brackets very little, except at the two extremes. The effect on the extremes explains the relatively large percentage of low-income families shown in census distributions and the corresponding understatement of frequencies at the upper open end. Moreover the evidence presented at the Conference suggests that understatement of income in the 1950 census was not proportional.

The PES and the CQC have given added stress to the importance of obtaining income information from first quality respondents and of using a highly trained and supervised field force. But the large amount of underreporting disclosed by the Audit Control Program of the Treasury Department suggests that underreporting is a serious problem even when reporting is mandatory, penalties are attached to concealment and underreporting, and revenue agents scrutinize the returns. While Farioletti's analysis covers only taxpayers with incomes in 1949 under $10,000 and all returns with business income regardless of total income (but not partnerships), the underreporting disclosed amounted to $4.7 billion. Although this figure represents only a minimum measure of the actual errors, it goes quite far in explaining the gap between Office of Business Economics (OBE) estimates of personal income (adjusted for coverage) and adjusted gross income reported on tax returns, as Pechman shows. He estimates that for 1949, the unexplained portion of the gap was only 3½ per cent of total personal income and suggests that allowing for underreporting of persons with incomes over

[5] For a comparison of the PES with the census distribution, see Herman P. Miller, *Income of the American People,* Wiley, 1955, Table B-15. For a technical description of the PES, see Eli S. Marks, W. Parker Mauldin and Harold Nisselson, "The Post-Enumeration Survey of the 1950 Census: A Case History in Survey Design," *Journal of the American Statistical Association,* June 1953, pp. 220–243.

$10,000 and of some information on persons not required to file will come near to closing this remaining gap.

National aggregates do not provide an entirely independent yardstick for measuring underreporting on tax returns because, as Schwartz points out, the OBE estimates embody some information derived from tax returns. Yet the OBE estimates of total personal income have become so firmly established that the need to reconcile any size distributions of income based on field surveys with national totals becomes inescapable. But reconciliations raise a number of technical questions, such as adjustments for the income concept used, the population covered, and imputations.

Selma F. Goldsmith provides a careful analysis of the underreporting uncovered by comparing the totals derived from distributions from the 1950 census and from the CPS (1944–1954) with corresponding totals from the national income accounts. (She also compares the degree of underreporting in the SCF which gives rise to broadly the same problems of response and enumeration errors as the census distributions.) Her analysis suggests that in the years 1947–1954 the CPS covered between 82 and 84 per cent of the total family money income estimated by the OBE (adjusted to the census concept of money income) and that the last decennial census covered 83 per cent of such income in 1949.[6] (In the first postwar years the percentage covered by the CPS was lower, between 72 and 80 per cent of the OBE income.)

A comparison of aggregate income data from the census and from other sources was made for only one segment of the population—farm families. Similar comparisons with census data could have been made for selected professional groups for which the OBE collects income data through mail questionnaires.

D. Gale Johnson undertook a detailed reconciliation of census aggregates for 1949 with those of the Agricultural Marketing Service (AMS). Grove compared size distributions for selected years between 1945 and 1954 as well. Grove concludes that the 1949 census distribution of farm-operator income was entirely out of line with the CPS distribution and all other distributions summarized in his Table 1. Even though the CPS apparently missed approximately 700,000 farms, between 1947 and 1954, it accounted for between 89 and 99 per cent of the total income of rural farm families as estimated by the AMS, except for 1949, when the percentage fell to 75 per cent (compared with 79 per cent accounted for by the

[6] The Census Bureau estimated from preliminary samples that it covered 92 per cent (see *1950 Census of Population*, Vol. II, *Characteristics of the Population*, Part 1, p. 65).

census). The coverage of the farm income of farm-operator families was lower, apparently in part because the exclusion of transfer income from AMS aggregates tends to reduce their excess over totals obtained from field surveys (which include such income), but does not affect the comparison of farm-operator income.

Grove thinks that underreporting and other response errors may be more serious for farm income than for other types of income. For estimating farm income, he finds the question used in the 1950 census less satisfactory than those asked in the CPS in most years. He considers a separate question on farm self-employment income rather than a single question on total self-employment income, to be preceded by a question on gross income, as an absolute minimum. (The gross income question might prevent the confusion between gross and net income which affected the 1949 census distribution to some extent, in particular at the lower levels.) Indeed, the modification of the census procedure in the PES, which asked for gross and then for net self-employment income, resulted in lowering the median income from self-employment by more than 8 per cent for males and more than 18 per cent for females, according to Pritzker and Sands (Table 17). Grove's conclusions agree with the contention of Sirken, Maynes, and Frechtling that entrepreneurial income is the Achilles' heel of income size distributions, and he endorses their recommendation for carefully controlled experimental surveys to find better techniques to cover this type of income.

While Grove's comparisons of size distributions are limited to farm income, those of Mrs. Goldsmith are for personal family income as a whole. Her findings on differential understatement by source of income in two Census Bureau field surveys (1946 and 1954) are perhaps more significant than her conclusion that about 20 per cent of personal income (after adjustment for conceptual differences) was missed by Census Bureau enumerators. If the underreporting had been systematic and uniform, a single factor could have been used to provide cross-classifications by income levels corresponding to a distribution consistent with personal family aggregates of social accounts.

Since sources and levels of income are correlated, differences among various kinds of income in the percentage unreported must necessarily lead to differential understatements by income level. Indeed, Mrs. Goldsmith finds (Table 4) that family income distributions derived from the 1954 CPS, in which wage and salary income was more fully reported than property and entrepreneurial income, show less inequality than OBE distributions, which fully account for

income from all sources. The distribution derived from the SCF for the same year falls between that of the CPS and the OBE for reasons discussed by Mrs. Goldsmith and, in greater detail for 1949, by Sirken, Maynes, and Frechtling.

Comparisons of aggregates (Goldsmith, Tables 2 and 3 and page 75 ff.) as well as matching studies (Pritzker-Sands, Table 18 and Miller-Paley, Table 10) suggest that underreporting was smallest for wage and salary income, although 7½ per cent more families reported such income on income tax returns than to the Census Bureau canvassers. The most serious underreporting occurred for income from sources other than earnings: entrepreneurial and property income as well as social security and other transfer payments. The PES shows that the census missed about one out of three persons with income from "sources other than earnings" (Pritzker-Sands, Table 20), mostly, but not exclusively, in the lowest brackets. When income reported on tax returns is compared with that reported to Census Bureau enumerators (narrowing the definition of income to make it more comparable with "taxable income"), it appears that an even larger proportion of income from "other sources" was missed. For income from self-employment, the PES uncovered relatively few units missed by the decennial census. The matching with tax returns, however, produced substantially larger numbers with such income (including net loss) among nonfarm residents, although substantially the same numbers among farm residents. For both residence categories, however, tax returns showed a considerably larger proportion with net losses, and the median income of units reporting income from self employment was consistently (about one-third) lower in the matched tax returns.

When it is sufficient to rank units by income rather than to associate given characteristics with specific levels of income, a systematic, uniform underreporting of income does not present an insurmountable problem. For example, concentration of underreporting at the extreme upper end of the distribution with fairly uniform rates of underreporting below this would introduce relatively little bias in associating such characteristics as educational levels with income.[7] And Mrs. Goldsmith's analysis suggests that this may be the pattern in field surveys, including the annual CPS and the 1950 census.

However, in other cases differential underreporting by source of

[7] The position of the regression line will be lower than if "true" incomes were used on the ordinate, and most likely its curvature at the upper end of the income scale would be understated; yet for a wide middle range, the curve would portray rather faithfully the nature of the relationship.

income, and consequently by size, may lead to serious errors. For example, the hazard of using census data to appraise or compare the incomes of small geographic areas is obvious. In this connection, Mansfield's comments on city incomes, particularly the inclusion of college students in the size distribution, are relevant. Underreporting would presumably be an important explanatory factor for any differences uncovered in comparing state income totals derived from the 1949 census data with the OBE–state totals. Such a comparison, which would constitute an important guide in appraising census data for smaller areas, is an important gap in the comparisons presented in this volume. The only relevant analysis along these lines developed at the Conference is limited to income data for farm families in a few states. Johnson concluded that some adjustment in census family income data for rural farm areas for interarea comparability may be required for state to state comparisons.

The matching and quality check studies show that relatively small differences in medians are consistent with a substantial variability in response. Indeed, as an extreme case, one can conceive of a negative correlation between pairs of responses from two samples with an identical median (and mean) income. The Conference did not address itself explicity to the implications of differential underreporting and offsetting response errors detected by the analysis of response variability for the analytical validity of cross-tabulations of socio-economic characteristics by income.

Yet the greatest potentialities of decennial income data lie in the fields of cross-sectional and regional analysis. Schweiger draws attention to one implication of the large variability of income response in field surveys (which presumably would extend to other financial questions, as suggested by the data on savings accounts referred to by him) for any analysis using cross-classifications of income with expenditure, asset holdings, and any other demographic or financial variables. Even if the medians of the "true" population and the survey population are identical, in spite of large gross differences at various income levels, regressions between income and expenditure (or other variables) derived from them may differ significantly.

How gross income response errors are related to errors in reporting other characteristics of the census population was not investigated in the PES. Any interaction of such errors may have resulted in significant net errors, as Pritzker and Sands point out. Furthermore the re-enumerative check revealed that characteristics other than income (age, occupation, and so forth) are also subject to substantial error. Kaitz warns that if response errors on such char-

acteristics as sex, age, and urban or rural residence are not correlated with response errors on income resulting in bracket misclassifications, the comparison of such variables in terms of income must necessarily be impaired.

Schweiger, on the other hand, suggests that misclassification of income tends to smooth out bracket differences in other population characteristics, such as age or family size, because each group reporting in a given income interval includes, in fact, units from a much wider range of incomes. Thus, the $4,000 to $4,999 bracket includes units with actual incomes from $2,000 to $9,999 or even beyond, and the matching surveys suggest that the proportion of the units misclassified is quite substantial. On the other hand, Kaitz sees the presence of random response errors as tending to exaggerate the degree of inequality of a size distribution.

The various cross-classifications of the matched samples suggest that response errors are random, but no detailed test of randomness was made, and the question cannot be considered closed. Kaitz believes that evaluation of the randomness of the empirical response errors would be advanced by the construction of a formal response-error model and by an examination of its properties and implications. Possibly underreporting is not random but instead systematically correlated with the inclusiveness of the income concept. If so, the degree of underreporting would tend to be greatest in the survey using the most inclusive concept.

By bringing the variability of income response into focus, the Conference authors raise a warning signal for the users of these and similar distributions in cross-sectional studies. They also raise the question of what could be done to reduce response variability.

COORDINATION OF INCOME SIZE DATA

The joint use of income data from several sources may serve purposes other than quality checks. Indeed, in preparing the annual income size distributions, the OBE must do just this. And in Part III, Grove refers to AMS distributions of farm income derived by matching income data from a sample of schedules from the 1950 Census of Population with data on the value of farm products sold and some related cost data from the 1950 Census of Agriculture.

The integration of income information from two or more sources may shed considerable light on the dynamics of income distribution. Coordination of CPS and OASI data, strongly recommended by Mandel, Wolkstein, and Delaney, would provide the basis for a more detailed analysis of wage and salary income. For example, such income could be related to the duration and continuity of an em-

ployee's attachment to an industry and to the size and location of the employing firm. Future coordination will be increasingly useful, since the proportion of nonmatches is likely to be reduced by the raising of the limit of taxable wages since the last census, and even more by the substantial extension of the coverage of the social security program, which is now almost universal.

Similarly, coordination of census and IRS data may permit study of sources of unearned income of wage and salary earners, and a more detailed study of patterns of income of taxpayers who receive the bulk of income from sources other than earnings. Pechman urges that the "statistical bridge" technique developed by Hart and Lieblein for integrating field survey and tax return data,[8] expanded to embody corrections for underreporting of tax income, be used to derive size distributions of income in decennial censuses and perhaps even in the CPS.

Some of the difficulties of coordination have been revealed by the quality check studies. Yet, the joint use of census data with other types of data will probably become of increasing importance in analytical studies of income distributions in spite of the differences in coverage and definition. The very existence of several distinct bodies of income data raises the question of their interrelationship; not only of their consistency, but also of their significance for various types of economic analysis.

CONCEPTUAL PROBLEMS

Several of the papers and comments underline the dependence of size distributions on the income concept, the unit of enumeration, and the income period used, thus confirming the conclusions of earlier investigators. Obviously income distributions based on surveys, including census data, must use income concepts corresponding as closely as possible to the respondent's notions of what constitutes his income. By contrast, in "exhaustive" distributions of total personal income, like those prepared by the OBE from a broad range of sources, various types of income in kind must be imputed to individuals. They will include some types that respondents normally would not report because of failing to recognize them as part of their personal income; for example, investment income of life insurance and pension fund reserves and the undistributed income of personal trust funds.

Clearly, the more complex the income concept used or the larger the number of occasional or part-time workers in the family, the more difficult it becomes to obtain through field surveys complete

[8] Albert Gailord Hart and Julius Lieblein, "Family Income and the Income Tax Base," in Volume Eight (1946) of Studies in Income and Wealth.

and correct information on annual family income. But after all, the need for completeness and exactitude depends on the uses to which the data are to be put. "Are there any essential uses of decennial statistics that require medians to be accurate within $100?" ask Pritzker and Sands. Since for a sample of a given size, errors can be reduced by better training of enumerators, by greater efforts to obtain response from the best qualified respondent, and by better editing, the problem is essentially reduced to one of choice. With given resources, one can either reduce response errors or increase the range of information obtained.

A better synchronization between income and labor status information is necessary, as pointed out by Miller and Teper. Goldfield holds out the prospect that the 1960 census will relate earnings to a person's principal employment status and occupational and industry attachment, as it should, rather than to his work experience during the census week. A corresponding step would be to tabulate family income on the basis of family status during the income period rather than during the census week. Such a reconstruction of families, which, as Mrs. Goldsmith points out, is the first step toward a permanent status approach, involves considerable difficulties. It raises the question to what extent the Bureau of the Census can go beyond the mere publication of tabulations based on edited schedules.

Similarly, tabulation of income by economic families, which is preferable for certain types of economic analysis, would go beyond the concept of biological families on which census reports (including the CPS) are based. SCF and OBE estimates show that the number of separate spending units exceeds that of biological families by about one-seventh. This relationship depends on a variety of factors, including the level of economic activity and wartime influences, and thus is by itself an important explanatory factor of size distributions, as Miss Podoluk suggests. Additional tabulations of census income data by spending units (economic families) seem to involve cost rather than conceptual considerations. But even for biological families, many of the relevant determinants of family income (and in family formation) are lost when family incomes are classified by characteristics of the heads of families only.

PROBLEMS OF INTERPRETATION

In recent years, rising aggregate income has not merely caused the upward shift of most units along the income scale; it has also changed the way income was produced and consumer income was distributed. An important effect of higher levels of employment has been to raise the incomes of those more or less permanently in the

labor force. But increased employment opportunities and higher wages have tended in recent years to draw additional workers into the labor force, including many housewives and very young and very old workers. Some seek only part-time employment, and many of those working normal hours receive lower than average wages because of lack of qualification or work experience. At the same time, some workers who qualify for retirement, including those entitled to private pensions, are encouraged to continue to work because of labor shortages. More students seek vacation employment and even terminate or interrupt their studies to enter the labor force.

Thus, while higher wages, the elimination of short hours, and overtime work tend to increase the income of the core of the labor force, the new entrants tend to be more heavily concentrated on the lower end of the income distribution, the more so in that some casual workers work only part of the year. At the same time, more workers of retirement age, many of whom are relatively good earners, continue to draw producer income rather than transfer payments, normally only a fraction of their earned income. This is likely to be an offsetting influence.

Working housewives and children are mostly supplementary earners. In other cases additional employment may lead to the formation of additional consumer units. Thus the upward movement along the income scale of consumer units with additional earners tends to be obscured by the breaking up of some existing units and the emergence of substantial numbers of additional units, many of which will be ranked near the lower end of the scale. This is particularly likely if they include one person families or units formed during the year and thus with independent income for only part of the report period.

We know by now enough about the income structure in the United States to appreciate the significance of distinguishing between permanent and transitional factors, and units, at both extremes of any distribution. The increased interest in income status (income averaged over a period of years) versus incidence (income in a given year), exemplified by such studies as the one reported by Eleanor M. Snyder, requires the separation of units whose family, and, perhaps, labor force, status has changed during the year.

The problem of distinguishing between income incidence and income status can be approached from several angles. Its importance is put into relief by Miss Snyder's finding of a smaller relative frequency in the lowest income class (under $1,000 in 1950) of unattached individuals and families with low current income

but not low economic status than of those with low economic status. Undoubtedly, a companion study would show that there are also considerable numbers of units of low income status who during a given period, because of windfall income and other transient factors, are enumerated in the higher income brackets.

A census-type survey does not necessarily preclude distinguishing between permanent and transient components in family income. Income questions can be expanded to include inquiries about overtime, dual jobs, earnings of members of the family who are not permanent members of the labor force, and other relevant factors. Such a multiplication of income questions would probably be feasible for a relatively small subsample only. Yet an inquiry into the permanent and transient components of income is essential for the understanding of size distributions.

The more the income period is lengthened, the more a size distribution is likely to reflect income status rather than income incidence. Yet it is unlikely that census inquiries could extend the income horizon beyond one year. Furthermore, any lengthening of the income period increases the probability of understatement because of lapses in memory and changes in family composition. But one could conduct successive surveys of an identical sample or accumulate information for successive income periods for an identical group of income recipients.

More generally, interpretation of changes in income distribution requires focusing on mobility. Decennial census data cannot be expected to provide more than a framework into which to fit more frequent and more specific investigations into specific elements making for changes in relative income positions. Some of the main systematic factors are demographic. For the analysis of such data, the population census is the primary and most complete source of data, in particular when geographic factors are taken into consideration or when the analysis is narrowed down to specific regions or communities of certain size or locational characteristics. For most analytical purposes, multivariate tabulations are required, and most census income tabulations are univariate. However the problem is principally one of securing sufficient financial resources to utilize fully the potentialities of the basic information normally collected. In the last two population censuses nothing like a full-scale exploitation of all the possible significant cross-classifications by income was attempted because of budgetary limitations. Even the modest initial plans for basic tabulations had to be subsequently curtailed.

CENSUS AND OTHER SIZE-DISTRIBUTION DATA

Goldfield reminds us that before the turn of the century the decennial census was the chief avenue open for collecting socio-economic data. Even though a wide variety of financial inquiries was included in most censuses, beginning with the first census of agriculture taken in 1840, the first census to include questions on income was taken a century later.[9]

Population censuses are, indeed, not necessarily the logical vehicle for collecting income data. A recent survey prepared for the Statistical Commission of the Economic and Social Council of the United Nations suggests that the use of population censuses to collect income data is far from universal.[10] Between 1948 and 1953, twelve countries included income questions in their censuses, in most cases for the first time. In addition to the United States and the Philippines, only four Latin American countries and six British Dominions have used censuses to obtain income data, but two of the latter also derive size distributions from income tax returns. By contrast, in eight European countries knowledge of income size distributions is drawn from tabulations of income tax returns. In the United States, income questions were introduced into the decennial census as a significant variable in the demographic and socio-economic analysis of the population structure and not primarily to derive national distributions of income. As suggested by Goldfield, the CPS can be made to carry a good part of the burden of a more detailed probing into the dynamics of income size distribution. He thus raises the question of the respective roles that the decennial census and the CPS should play as primary sources of data on the income structure.

Since the Conference was focused on the quality check of the 1950 census, income data collected by the CPS have been referred to only obliquely, except in the Goldsmith and Grove papers. Yet, in a very real sense, the CPS has developed into a miniature population census. Since in the 1950 population census income information was obtained on a sample basis, and since a large sample (20 per cent) is not necessarily the most efficient one, the question of the specific advantages of including income questions in the decennial censuses was raised at the Conference. Goldfield compares the respective merits of the two bodies of income data collected by the

[9] For a detailed description of the income questions, see A. Ross Eckler, Richard H. Crawford, and Selma F. Goldsmith, "The 1940 Population Census," in Volume Five (1943) of Studies in Income and Wealth.

[10] *Statistics of the Distribution of Income,* Document E/CN.3/208, February 10, 1956.

Bureau of the Census and finds that the miniature census has considerably more advantages than disadvantages. One important shortcoming of CPS is the lack of detailed occupational cross-classification which he thinks could be overcome by expanding the sample. Moreover, Miller's earlier analysis showed great stability in the wage structure by industry and occupation.[11] Similarly, the other major shortcoming—that the CPS sample is too small to provide data for states and smaller areas—could be overcome by expanding the sample. A first attempt in this direction is currently underway in the State of New York, where an expanded CPS sample will provide additional income data to permit a rather detailed analysis of the income structure in that state.

The place of decennial income data within the large structure of income data which has been gradually developed in this country, including size distributions, clearly arises from the Conference discussions. How often are various types of income information desired? How large a sample is needed to obtain each of the most needed types of income distributions and cross-classifications of income with other variables? How precise must the income distribution data be?

Different users of income data will not agree on answers to these and similar questions. Indeed, three ways of looking at income size distributions emerged from the Conference discussion. One way—and perhaps the one which prompted the inclusion of the income question in the census—is to look at income primarily as one of the variables associated with fertility, housing arrangements, or other socio-economic relationships in which income enters as a cause. Another is to look at income distribution as one of the most significant end results of the economic process, with interest centering on explanatory variables accountable for the dynamics of size distributions, such as educational levels, occupation, industry attachments, or ownership of assets. A third and perhaps more novel look, is to regard income as one of the elements in the decision-making process involving issues of economic and social policy.

When income is used as one of the explanatory variables, usually a ranking of units by income level will be sufficient. Where income enters as a datum in the decision-making process, absolute levels rather than ranking will usually be significant. Indeed, dividing lines based on discriminants such as minimum budgets are likely to be drawn on the basis of specific dollar levels, although occasionally they might be drawn at some quintile or similarly defined level.

It is primarily when income is considered as a result that one must

[11] Miller, *Income of the American People,* Chapter 5.

have exhaustive distributions and go beyond what Lampman calls "standard distributions" in order to probe into determinants of income. Analysis of factors making for income inequality and for temporal variability will necessarily focus on sources of income. More detailed information is also needed on the structure of spending units, the work history of the main and supplementary earners, their past earning record, and on family assets.

Mrs. Goldsmith makes a strong case for size distributions by source of income. In discussing Miss Snyder's paper, Miss Podoluk is able to show that in Canada, which distinguishes five income sources, about half of the income in the lowest bracket is derived from transfer payments. No such detail by income level is regularly available in the United States, although an annual breakdown of total family personal income by source is estimated. In the 1950 census, data on three types of income were collected. The published distributions show only the number of persons with each of the three kinds of income, in various combinations,[12] but not the sources of income for all persons in each given income interval. The feasibility of collecting sources of income data through field surveys should be explored further, using the experience of the SCF as well as of the CPS. The analytical importance of data on income by source has been exemplified in recent studies on changes in size distributions of income.[13]

Clearly, a variety of distributions of income by size and numerous types of cross-classifications of income with socio-economic characteristics are required. To evaluate the particular function which decennial benchmarks may play, it would be desirable to obtain a comprehensive analysis of the actual use of the rich and varied array of income data provided by the two last decennial censuses. Yet it is exceedingly difficult to obtain a view of all the analytical uses, legitimate or not, made of census income data. Pritzker and Sands state that the Bureau of the Census itself does not have a clear idea of the extent of the use of these data. The limited use made of the income data from the 1940 census was probably chiefly the result of their wartime publication and their limitation to wage and salary income. And by the time tabulations from the census of 1950 were published, users of income data had become familiar with distributions for several years from the CPS.

Apparently the annual income data from the CPS are more exten-

[12] *1950 Census of Population,* Vol. II, *Characteristics of the Population,* Part 1, Table 143.

[13] Such as Simon Kuznets, *Shares of Upper Income Groups in Income and Savings,* National Bureau of Economic Research, 1953.

sively used than those from the 1950 census, although the CPS offers fewer cross-classifications. Even the census monograph on income includes no general size distribution based on decennial census data.[14] In the monograph the analysis of the determinants of the income distribution (Chapter 3) is based on the CPS and other annual survey data rather than on tabulations from the 1950 census.

However for small geographic areas the decennial census represents the only source of income data. Indeed, the samples of the two other annual field surveys are too small to yield even regional income distributions. Yet in discussing the use of the 1950 census income data for small areas, Edwin Mansfield concludes that their potentialities have scarcely been explored and discusses possible causes of this apparent neglect.

Neither the type of area income data required nor the significance of geographic factors as an explanatory variable of income structure was within the scope of the Conference.[15] Yet the way the need for area income data can best be met deserves attention. Do users of small area income data necessarily need size distributions? Would the total area income and the number of units with income above a given level, which could be varied to reflect differentials in the cost of living, be enough? Perhaps a ranking of counties by average income by family (or per capita, or by income recipient) would meet most of the needs. What is the analytical value of detailed cross-classifications by county in view of the great variability uncovered by the matching studies? And would not county data by source of income, constructed from the OBE state income data by using various allocators, serve more needs, possibly at less cost, than size distributions for the same areas? Which is more limiting, the differential underreporting and response variance in decennial census data or the synthetic nature of county aggregates derived on the basis of allocators? Payrolls, county farm data, and perhaps federal income tax data could be used as allocators. However, to my knowledge, so far the federal income tax data have not been used for this purpose, although state income tax data have.

When geographic factors are used as explanatory variables, the size of the CPS sample can probably be expanded enough to provide all the nationwide breakdowns desirable to compare distributions of the farm, rural, nonfarm, and urban areas, of urban areas

[14] Miller, *Income of the American People.*

[15] Several of the papers in Volume Twenty-one (1957) of this series use census data for states and small areas and deal with some of the questions involving their use.

of different size, and of broad geographic subdivisions of the country. Additional comparisons could be obtained for core and fringe segments of urban areas, or for farm areas classified by the predominant type of farming, product, or farm organization.

Mansfield's suggestions deal with the presentation of census income data for small areas. Lampman makes some more general proposals on the presentation of income size data. He suggests distributions in deciles rather than in fixed dollar intervals, arrayed with the main demographic characteristics of the population falling within each decile, a presentation that would contribute to a better understanding of changes in the degree of inequality. He also suggests the need for size-distribution analysis on the basis of three different concepts. One of these concepts, "producer-contribution income," aims at measuring income shares arising from the participation in the production process (see his Table 1 for the relation of this income concept to the one used in the 1950 census).

More explicitly than Lampman, in commenting on Goldsmith's paper which stresses the stability of the decile distribution of personal incomes since the war, Pechman raises the question whether a complete accounting for economic income of persons should not go beyond the OBE concept of family personal income that served as a bench mark for her estimates of underreporting.[16] A wide range of problems arises from changes in the process of income distribution under the influence of progressive personal income tax legislation combined with high corporate income tax rates and other developments in the institutional framework, some of which the United States shares with other advanced countries. While not quantifying any of these influences, Pechman provides an impressive catalogue of examples of such changes, which tend to increase the gap between economic and family personal income and which are of particular significance in the upper reaches of the income distribution. If it could be assumed that economic income not now measured as part of family personal income is distributed more or less proportionately over the income scale, the analytical significance of the issues raised by Pechman could be minimized. All indications are, however, that the incidence of the types of income now

[16] For this writer's views similar to those expressed by Pechman and Lampman, in addition to the paper quoted by Pechman, see also George Garvy, "Inequality of Income: Causes and Measurement" in Volume Fifteen (1952) of Studies in Income and Wealth; and "A Report on Research on Income Size Distribution in the United States," National Bureau of Economic Research, 1955, mimeographed. See also Selma F. Goldsmith, "Changes in the Distribution of Income Among Economic Groups," *American Economic Association Papers and Proceedings,* March 1957.

disregarded is not proportionate to the size of total income. Furthermore the variation in incidence is more significant for some types of income than for others. Thus family personal money income cannot be taken as a "proxy variable" for the economic income of persons.

The crux of the matter seems to be that as better and better ways of measuring the distribution of personal money income are developed, and as the totals derived from field surveys come closer to national totals obtained by adding distributive shares, money income alone ceases to be fully indicative of either total compensation for productive services or of the purchasing power of the consumer in the market.

The stress is on "fully" and on the direction of change rather than on the amount of divergence between economic and statistical incomes that has already occurred. Yet, as Pechman points out, tax free income disguised as business expense, the transformation of current income into capital gains, the rearrangement of income flows over a lifetime to minimize the tax impact at the peak of earning capacity, and similar devices have considerably diminished the significance of distributions based on definitions that pay too much attention to form and too little to content.

Hardly anybody who has studied recent trends in executive compensation, in collective bargaining contracts, and in the investment policies of individuals can escape the conclusion that a real problem has to be faced. But its statistical dimensions, its differential impact by income level, and its significance for the entire problem of measuring size distributions for limited periods of time within an integrated system of social accounts are unknown. Is a redefinition of personal income needed, or a more complete analysis that would treat accrued and deferred income as changes in assets? But will such a solution meet the challenge of personal income masquerading as business cost, or fully measure the impact of the adaptation of various forms of compensation to minimize income taxes? Yet in a welfare economy where assets are distributed more widely than ever, and where the certain, contractual prospect of delayed payments reduces the need for current income, no picture of income distribution is complete unless it takes account of related changes in assets. At least it must account for assets that embody part of the compensation for productive services and that are a contributing factor in determining current expenditure patterns, including intangible assets like vested pension rights in noncontributory pension plans.

The issue thus raised is broader than income distributions. It is

relevant to the definition of total personal income, to the relationship between income and wealth estimates, and to the integration of income and other types of social accounts. The discussion in the present volume thus joins the body of thought developed at several of the preceding meetings of the Conference.