

AN INITIAL LOOK AT PREPARING LOCAL ESTIMATES OF HOUSEHOLD SIZE FROM INCOME TAX RETURNS

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The preparation of population estimates for states and local areas has grown a great deal in complexity and scope during the past three decades. The Bureau of the Census now has regular programs in place for preparing estimates of total population and per capita income for states, counties and cities, and of the age distribution and number of households for states.[1] Experimental population estimates by race for SMSA's, and by age and sex for counties, have been prepared and can now become regular programs as time and resources permit.

Estimates of households by number of persons in the household for states and sub-state areas would represent a significant expansion of the detail provided by the estimates program. Household size estimates would be valuable for local planning and market analysis, and, perhaps more importantly, would provide the basis for income estimates by size of household for local areas. Between the decennial censuses, such income estimates are available only from sample surveys, which must be of considerable size in order to obtain reliable data for states or large metropolitan areas. The 1976 Survey of Income and Education obtained interviews from 151,000 households and provided income and household size data for states. Extending the estimates to smaller areas, for example counties of 50,000 or more, would require a very large sample.

An alternative source for household size estimates could be provided by tabulations of federal income tax returns. For many households, the number of exemptions on the tax return corresponds exactly to the number of persons in the household.[2] For example, married couples with young children will generally file one joint return which lists as exemptions exactly those family members present. Obviously, there will be exceptions to this correspondence. Many unmarried persons of college age file a single return while legitimately being included as an exemption on their parent's return. These and related problems need to be studied and techniques developed to deal with them.

Although the aim is to produce estimates of households and household size distributions for states and local areas, the statistics needed to actually prepare satisfactory test estimates are not now available. This paper demonstrates relationships between survey data on households and tax return information at the national level, and indicates the procedures which will be used to prepare estimates for sub-national areas.

RELATIONSHIP BETWEEN HOUSEHOLD SIZE DISTRIBUTIONS AND TAX RETURNS BY NUMBER OF EXEMPTIONS

In March 1980, the Current Population Survey estimated the household population at 217 million,[3] of which 161 million lived in households maintained by married couples. There were 147 million exemptions on joint tax returns filed in 1980 (for income received in 1979)[4], and the distribution by number of persons in the house-

hold and number of exemptions on returns is as follows: (in millions)

No. of Persons/ Exemptions in Unit	Pop. in Married Couple Households	Exemptions on Joint Tax Returns
Total	160.9	147.2
2	35.9	33.4
3	31.6	28.2
4	43.0	40.1
5	26.4	24.9
6 or more	24.0	20.6

Although total exemptions are 8 percent less than population, if the relationship proves to be stable over time it would be possible to estimate change in size distributions of married couple households by change in joint returns. [5]

One would expect more difficulty in working with the remaining categories of returns and households. The figures for the remaining types are: (in millions)

No. of Persons/ Exemptions in Unit	Pop. in Households Other Than Married Couples	Exemptions on Tax Returns Other Than Joint
Total	56.6	61.0
1	17.8	38.2
2	13.6	9.2
3	9.9	6.8
4	6.9	3.6
5	3.6	1.8
6 and over	4.8	1.4

The most serious non-correspondence is for the "1 person" category, with more than twice as many returns carrying 1 exemption as there are 1 person households. The excess of exemptions is due in part to persons sharing a housing unit but filing separate, single returns; in part to young persons living with their parents but filing a single return; and to various other situations. Although this is a serious problem, there are possibilities for alleviating its effects (see below). Another problem is the discrepancy between exemptions and population for large-sized households of 5 or more persons. These households are predominantly families with female head-of-household; presumably many of these have taxable incomes below the minimum required for filing. In some communities change in this group could lead to substantial error in the estimates, since it would not be adequately reflected in tax return data. It might be possible to estimate the number of families not filing tax returns from data on welfare recipients. However, the standards for coverage vary from state to state.

While admitting the presence of problem areas, the difficulties cited do not necessarily invalidate an estimating program, and a time series has been developed at the national level comparing tabulations of tax returns with CPS household estimates. The tabulations of tax return

information were developed by the Bureau of the Census during the preparation of population estimates for the Federal General Revenue Sharing program. Tabulations are available for tax years 1976, 1978, 1979, 1980, and 1981, but only for the nation as a whole. [6] Tabulations for 1977 are not available, as the tax returns filed in that year were not processed for Revenue Sharing estimates.

Table A compares the exemptions on tax returns for these years with national household data from the Current Population Survey. The data are shown graphically in Figure 1. The ratios of exemptions to returns are quite stable, especially for joint returns and married couple households, except that in 1980 the ratios are about 1 percent higher than in other years. In that year the tax file made available to the Census Bureau was taken off two months later than in other years in the interest of obtaining a more complete file. This factor and others which affect the proportion of the population represented by exemptions on tax returns must be carefully monitored, and methods devised to allow for variation from year to year. A number of major changes which affected the filing rate were made in the tax laws between 1970 and 1975. Such changes can be expected in future years and the estimating methodology must be structured to minimize the impact of such developments.

The stability of the ratios for married couple households and joint returns in Table A also extends to the distributions by size of household. Figure 2 and Table B show the relative distributions by number of persons in the household and by number of exemptions on returns for the period 1976-1981. The figure illustrates a pronounced increase in the proportion of 2-person units and a decrease in the proportion of units with 6 or more persons. The data for both households and exemptions reflect these trends in a similar manner, suggesting that change in households by size could be estimated by change in exemptions.

This optimistic observation must be tempered by the difficulties which can be anticipated with returns other than joint. Table C shows the ratios of exemptions on these returns to other than married couple households. Figure 3 presents the data in graphic form. The heavier filing rate in 1980 can also be observed in this data series. The problems of the excess of single-exemption returns over 1-person households can be seen in the lower portion of Table C. Not only are returns more than twice the number of households, but the ratio varies considerably from year to year. There are some possibilities for dealing with this and other related problems (see below, items 1, 2 and 5).

#### PLANS FOR ADDITIONAL RESEARCH

Although relationships between survey data on households and tax return information are promising at the national level, subsequent analysis must address states and local areas. Variation in the relationships among local areas could present serious and even insurmountable problems. The IRS annual reports give state figures

on returns by number of exemptions, and these could be used to prepare test estimates [6]. However, the sample variance makes it inadvisable to use them to test a procedure for estimating households by size [7]. In the course of developing the Revenue Sharing estimates during the period 1970-1980, the Census Bureau extracted 10 and 20 percent samples of tax return data. For these samples some demographic information is available for primary filers, making it possible to classify returns by age, sex, and race of the filer. As time and resources permit, tabulations for states and local areas by number of exemptions on returns will be prepared from one of these files, and a test will be conducted. The 1970 census counts of households by size for states and/or SMSA's will be carried forward to 1980 using change in tax returns by number of exemptions on the return, modified by national change, as shown by the Current Population Survey. The following general procedure is envisioned:

- a. Calculate the ratio of households to returns in 1970 by size of unit.
- b. Adjust these ratios for national change 1970-80 as shown by comparisons of CPS estimates and national totals of tax return information.
- c. Multiply the distribution of tax returns in 1980 by the adjusted ratios to obtain an estimate of households by size. These estimates could be controlled to independently derived estimates of total households.
- d. Compare the estimates to the census counts.

This simple procedure can be refined in a number of ways.

1. Separate computations for married couples and all other households can be carried out using different procedures, if advisable.
2. Single returns can be sub-classified in order to improve the correspondence of these returns to 1-person households. For example, returns filed by persons under 18 years of age and/or reporting small incomes can be excluded. Information on the number of returns reporting interest and dividends only can also be tabulated, and should help to identify filers of single returns who are still residing with the main family unit.
3. Separate computations can be made for persons over and under 65 years of age.
4. The tax return data can be adjusted by deleting exemptions for "parents away" and "children away". This would eliminate from the computation persons presumably not living with the filer of the return.
5. More precise use of information by type of return filed is available. In addition to estimating married couples from joint returns the categories "married, filing separately" and "unmarried household head" might be useful in estimating household size distributions. Table D shows data on households and tax exemptions by type of household and type of tax return. The category "married, filing separately" could con-

ceivably be adjusted and added to data for joint returns, since by definition husband and wife each file a return. However, an unknown number of couples who have legally separated file in this category, making it difficult to estimate the number of separate households for the group.

6. If the 10 percent or 20 percent extracts of tax files are used, the computations could be specific by age, sex, or race of the filer, using information already in-house.
7. A model incorporating pertinent data from various sources could be utilized.

These alternatives provide a broad range of possible research strategies. Considerable experimentation can be anticipated before a satisfactory procedure is established, and success is not guaranteed. Nonetheless, the utility of household estimates by size for local areas is so great that a research effort in this field is amply justified. Even if the only result were to be usable estimates of the total number of households for counties and cities of 50,000 or more population, it would be worth a good deal of effort to develop the methodology. The correspondence between exemptions and persons is basically sound, and there is a good chance that exceptions to this correspondence can be dealt with by one or more of the alternatives listed above.

Arrangements have been completed to tabulate 1980 census data on households by size and type for counties and large cities. As the tax returns filed in 1980 and subsequent years are processed for the Revenue Sharing estimates, the Census Bureau plans to prepare tabulations for local areas by number of exemptions on returns.

Testing of estimating methodologies for the 1980 period will proceed as resources permit, with a view to initiating a program in the 1980's if and when a satisfactory estimating methodology is established.

#### NOTES AND REFERENCES

- [1] The Bureau of the Census Catalog for 1979 describes the estimates produced by these programs, along with a list of publications.
- [2] Additional exemptions for the aged and blind are not included.
- [3] To facilitate comparisons over time, this figure is consistent with the national population estimates obtained by carrying forward the 1970 census count with data on components of change.
- [4] Census Bureau tabulation of federal tax returns for income received in 1979, as filed in 1980.
- [5] The tables in this paper show population in households; the number of households can be calculated by dividing population by the number of persons in the household.
- [6] Statistics of Income: Individual Income Returns, Internal Revenue Service, Publication 79.
- [7] The sample variance of the IRS data make their use inadvisable for the purpose of testing a procedure attempting to estimate households by size, since the procedure itself carries an unknown potential for error.

Table A. Ratio of Federal Income Tax Exemptions to Household Population by Type of Household and Tax Return: 1976-1981

[Population and exemptions in millions. Household population as shown by Current Population Survey. Tax returns are for previous year's income filed in year indicated, as tabulated by the Bureau of the Census.]

Year and Type	Household Population (1)	Exemptions on Tax Returns <sup>1/</sup> (2)	Ratio: Exemptions to Population (3) = (2)÷(1)
All households/tax returns			
1981	<sup>2/</sup> 219.7	207.1	.943
1980	217.5	208.2	.957
1979	215.3	202.6	.941
1978	213.6	199.7	.935
1976	210.6	196.6	.934
Married couple households/ joint returns			
1981	<sup>2/</sup> 161.0	145.1	.901
1980	161.0	147.2	.914
1979	161.0	145.6	.904
1978	161.5	146.3	.906
1976	163.5	147.8	.904

<sup>1/</sup> Excluding aged and blind.

<sup>2/</sup> Household population for 1981 estimated for a 1970-based tabulation by adding 1980-81 change with 1980 census-based controls to 1980 tabulation with 1970-based controls.

Table B. Percent Distribution, by Number of Persons or Exemptions in Unit, of Married Couple Household Population and Joint Tax Return Exemptions: 1976-1981

Year	Number of Persons or Exemptions in Unit					
	2 and over	2	3	4	5	6 and over
<u>1981</u>						
Married couple households	100.0	22.2	19.9	27.1	16.6	14.2
Joint returns	100.0	23.0	19.4	27.5	16.7	13.4
<u>1980</u>						
Married couple households	100.0	22.3	19.6	26.8	16.4	14.9
Joint returns	100.0	22.7	19.2	27.2	16.9	14.0
<u>1979</u>						
Married couple households	100.0	21.6	19.3	26.6	16.9	15.6
Joint returns	100.0	22.4	19.0	26.8	17.0	14.8
<u>1978</u>						
Married couple households	100.0	21.1	18.8	26.1	17.4	16.6
Joint returns	100.0	21.9	18.8	26.4	17.1	15.8
<u>1976</u>						
Married couple households	100.0	20.7	18.1	24.7	17.5	19.0
Joint returns	100.0	21.2	18.4	25.3	17.4	17.7

Table C. Ratio of Exemptions on Other Than Joint Tax Returns to Population in Other Than Married Couple Households by Type of Household and Tax Return: 1976-1981

[Population and exemptions in millions. Household population as shown by Current Population Survey. Tax returns are for previous year's income filed in year indicated, as tabulated by the Bureau of the Census.]

Year and Type	Household Population (1)	Exemptions on Tax Returns <sup>1/</sup> (2)	Ratio: Exemptions to Population (3) = (2)÷(1)
Other than married couple households/joint returns			
1981	<u>2/</u> 58.6	62.0	1.058
1980	56.5	61.0	1.080
1979	54.4	57.0	1.048
1978	52.2	53.4	1.023
1976	47.1	48.8	1.036
One person households/returns with one exemption			
1981	<u>2/</u> 18.4	38.1	2.071
1980	17.8	38.2	2.146
1979	17.2	36.2	2.105
1978	16.7	34.0	2.036
1976	15.0	31.2	2.080

<sup>1/</sup> Excluding aged and blind.

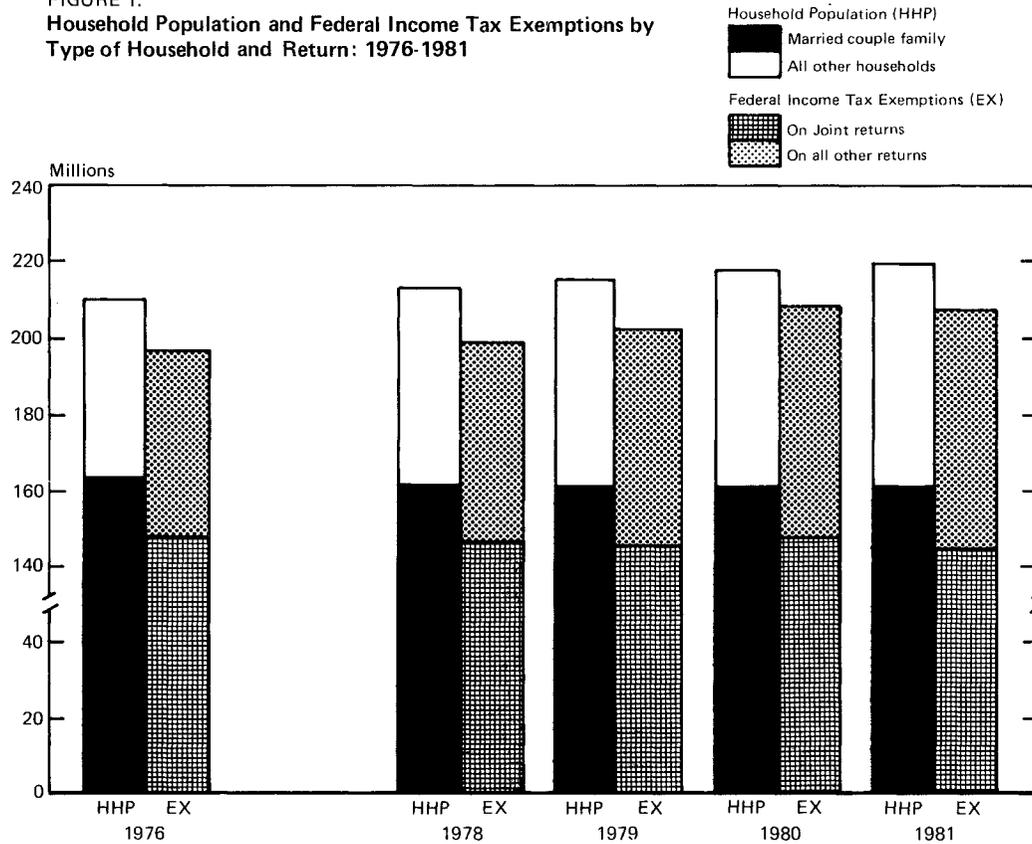
<sup>2/</sup> Household population for 1981 estimated for a 1970-based tabulation by adding 1980-81 change with 1980 census-based controls to 1980 tabulation with 1970-based controls.

Table D. Household Population and Exemptions on Tax Returns, by Type: 1980

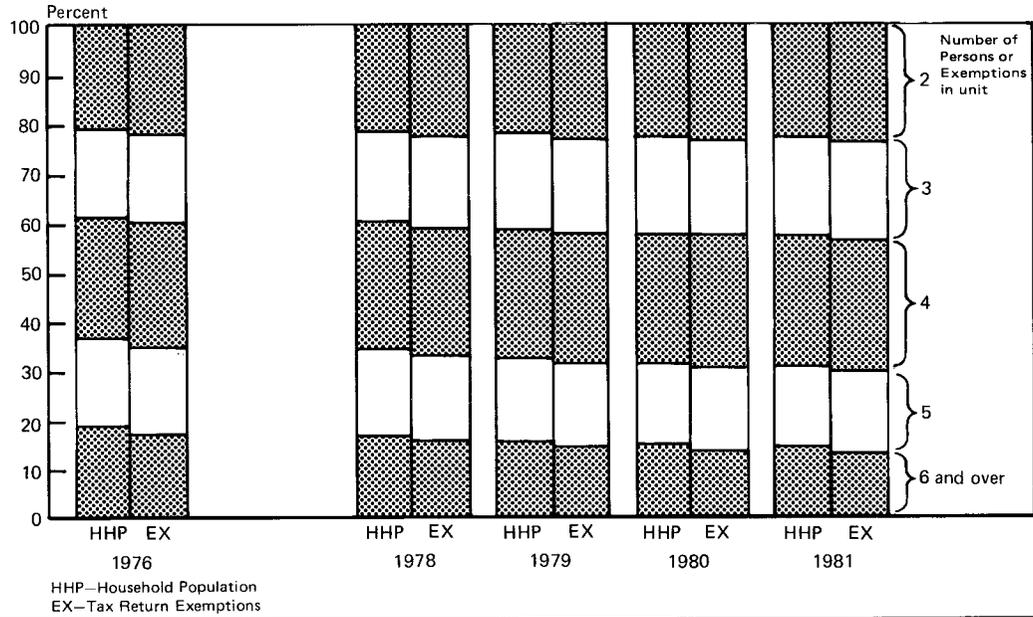
[Population and exemptions in millions. Household population as shown by Current Population Survey. Tax returns are for previous year's income filed in year indicated, as tabulated by the Bureau of the Census.]

Households		Tax Returns	
Type	Population	Type	Exemptions
Total	217	Total	208
Married couple	161	Joint	147
Other family	32	Unmarried household head	18
Nonfamily	25	Single	40
- with one person	18	- with one exemption	37
		Married, filing separately	2
		Other (Surviving spouse, taxpayer with spouse as dependent)	1

FIGURE 1.  
Household Population and Federal Income Tax Exemptions by Type of Household and Return: 1976-1981



**FIGURE 2.**  
**Percent Distribution, by Number of Persons or Exemptions in Unit, of Married**  
**Couple Household Population and Joint Tax Return Exemptions: 1976-1981**



**FIGURE 3.**  
**Population in Households Other Than Married Couple Households**  
**and Exemptions on Tax Returns Other Than Joint Returns, by**  
**Type of Household and Return: 1976-1981**

