THE DISTRIBUTION OF PUBLIC EXPENDITURE AMONG HOUSEHOLDS IN THE UNITED STATES*

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This paper presents an analysis of the distributive impact of government expenditures in the United States. The analysis uses a household-level microdata file drawn from the 1970 U.S. Census of Population, with additional income and tax variables drawn from the Internal Revenue Service 1969–70 Tax File.

The results are presented at both federal and local levels and include analyses of the distribution of individual benefits, as well as of overall taxes and net benefits. Since a microdata file was used, distributional effects are examined with respect not only to the "traditional" variables of income class and household size, but also with regard to the number of earners in the household and the sex and race of the household head.

In a further paper in a subsequent issue of this review we will present the results of a similar analysis for the United Kingdom, and compare the results for the two countries.

1. INTRODUCTION

In few countries have studies of income redistribution through public finance been so frequently undertaken since the second world war as in the United Kingdom and the United States of America. It is, therefore, surprising—especially in the absence of any language barrier between the two countries—that the pattern of studies in each should be so different.

In the United Kingdom, the government Central Statistical Office (CSO) has carried out such studies annually for the past twenty years, and its analyses (e.g. 1980) and related papers by their initiator J. L. Nicholson (e.g. 1974, 1977) constitute almost the entire body of empirical work on this subject in the U.K. The methodology used has remained largely unchanged since the early years of those studies. They concentrate on those taxes and government expenditures whose incidence is in general relatively clear, allocating approximately 60 percent of government revenue (constituting about 80 percent of tax revenues) and between 40 and 50 percent of expenditures. This large shortfall, particularly on the expenditure side, reflects a continuing methodological uncertainty about how to measure and allocate the benefits of public expenditure and the costs of taxes. A

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number of academic commentators, including, for example, Peacock and Shannon (1968) and Webb and Sieve (1971) have suggested the use of a series of alternative assumptions in cases of theoretical uncertainty, but have not had the necessary data to use (and show the effects of) such varying assumptions. The methodological debate in the U.K. is reviewed in O'Higgins (1980).

Early studies in the United States (e.g. Colm and Tarasov, 1941, and Musgrave *et al.*, 1951) concentrated on the tax side, again reflecting the greater difficulties encountered when dealing with public expenditure, but Gillespie's 1965 study made clear the extent to which it is indeed possible to allocate expenditures (using alternative assumptions where necessary) and thus to assess the redistributive impact of both parts of the public finance system. Academic rather than governmental studies have remained dominant in the U.S. and subsequent analyses (e.g. Musgrave *et al.* 1974, Pechman and Okner, 1974) have continued to deal with all government expenditures (and/or taxes).

This paper is the first of two which present the results of a comparative study of the distribution of public expenditures in the U.S. and the U.K. Our aim, in this study, has been two-fold. We have tried, first, to arrive at comparable estimates of the distribution of total public expenditures for both countries, using the "alternative assumptions" methodology developed by Gillespie. Secondly, we have tried to improve both the usefulness and the accuracy of our estimates by basing them, in both cases, on household level microdata rather than on grouped data. Use of a household-level microdata file as the basis for expenditure (and tax) allocations allows the allocation routines developed for each tax and benefit to be applied separately to each household, so that to the extent that taxes and benefits vary within an income class (or other group), this effect can be modeled. This results in some gains in the accuracy of the allocations made, and, perhaps more importantly, allows the distributional effects of fiscal actions to be analysed with respect to household characteristics other than income. Since household size, composition and location, the age of the head and of the various members, and the sex of the head, for example, may all have a direct bearing on taxes paid and on benefits received, such an analysis will clearly be of some interest.

The principal microdata files used in this study were, for the U.S., the Public Use Sample (PUS) from the 1970 U.S. Census of Population, and, for the U.K., the 1971 Family Expenditure Survey (FES). For the U.S. study, we extracted a 1/1000 sample from the PUS, based on the 15 percent sample made available by the Bureau of the Census. Additional income and tax variables, from the Internal Revenue Service's 1969–70 Tax File, have been added to the sample. These were allocated to households on the basis of a variety of household characteristics including income, place of residence, and race and sex of household head. For details of the methodology used, see Ruggles (1980). The FES file which we used for our U.K. estimates was augmented on an exact match basis with estimates provided by the U.K. Central Statistical Office for some taxes and expenditure benefits not included on the original FES tape. This procedure is discussed in more detail in the U.K. section of this study.

As mentioned earlier, this study has been written up in two parts. This paper gives a brief introduction to the methodology used (details of which for the U.S. will be found in the appendix) and presents the U.S. results. The second paper,

which will appear in a subsequent issue of this review, presents the U.K. results and compares them to those for the U.S. Due to lack of space, analyses of redistribution by all the characteristics which might be considered in a longer study cannot be included in these two papers, and in fact most of the results presented here pertain to the relatively "traditional" characteristics of income and household composition (although we have attempted to consider several aspects of both of these variables). In addition, in the present paper we discuss, as an illustration, one particular set of demographic breakdowns; namely, the impact of redistribution on household with heads belonging to differing race and sex categories. Further analyses for the U.S. may be found in Ruggles (1980).

Three further points should be made about the aims of this study. Firstly, although our primary purpose is to consider the distributive impact of government expenditure on households, it is not reasonable to do so without some attention to the distribution of costs, i.e. of taxes. Therefore, we also examine the distribution of net benefits, defined as total expenditure minus total taxes. The "total tax" figures necessary for these calculations are based on the tax allocation routines set out in the appendix, and, since it is intended that attention be focused on the expenditure side, these routines represent, as far as possible, a fairly "middle of the road" set of assumptions. Thus, the tax routines and figures will not be further discussed in this paper.

Secondly, to enable the results in this paper to be examined in the context of the bulk of previous work in both countries, the income status of households is indicated by their income before taxes and benefits—"original income" in the CSO terminology—but we have reservations about the validity of this income concept since the existence of taxes, transfers and in-kind benefits clearly lead to changes in the distribution of income before such taxes and transfers. Hence, in using this income concept we intend no presumption that this is how income would have been distributed had not the state intervened.

Finally, any study of two or more states must choose either to apply similar allocation methods to each state, regardless of international differences, or to use the routines which seem most appropriate in each case, even if this appears to reduce the comparability of the results. We chose the latter option, so that the allocation routines for specific taxes and expenditures in each country may differ. As indicated in the next section, however, the general principle underlying expenditure allocations and the sets of options used for "unallocable" public expenditure are common to the two countries.

2. The Allocation of Expenditure Benefits

The first problem in the allocation of expenditure benefits is the determination of the relevant total of public expenditure, since the national accounts total will not necessarily be appropriate to an analysis of redistribution. In fact, we have allocated only about 85 percent of total expenditure in each country. For the U.S., expenditures not allocated include factor returns to lenders and lending by the government, which should be included only insofar as they constitute an economic rather than as accounting cost to the government (i.e., as the

opportunity cost to government of a lower rate of interest than might otherwise have been received).[1]

These exclusions on the expenditure side are reflected on the revenue side also, so that the relevant revenue total consists of tax revenue only. We have not made any attempt to equalize the actual amounts of relevant revenue and expenditure since, although the question of whether only a balanced government budget should be allocated has generated a certain controversy (see, for example, Peacock and Shannon, 1968), there seems to us to be no convincing reason why government expenditures beneficial to the residents of a country need necessarily equal the taxes levied on those residents in any one year.[2]

The next, more difficult, problem in the allocation of expenditure benefits is the determination of the extent to which the benefits of any particular expenditure are in fact specifically allocable. There are few public expenditures that have no public good aspect: expenditures on education, for example, benefit not only individual students, but also society as a whole, insofar as it gains a more educated population, and most other public expenditures can be seen analogously. Even if one were to consider only those aspects of public expenditure which are directly allocable, it is still very difficult to know exactly how much one should try to allocate. There is no particular reason why benefits from public expenditure should equal the amount expended. Nevertheless, in order to be able to make any estimates of the distribution of benefits from public expenditure, it is necessary to deal somehow with both these problems. This paper follows the example of previous studies in both the U.S. and U.K. and asks the question, "on whose behalf was this particular expenditure made?," rather than "who benefits and by how much?" Thus we allocate not the "true" benefits of public expenditures, but rather, its total costs, and this allocation is carried out in proportion to the costs incurred by each particular household. Thus, in the schooling example, expenditure on schooling would be allocated to families with children in school, on the grounds that these expenditures are costs incurred on behalf of those children. The full details of the allocations which have been made are set out for each expenditure item in the appendix to this article.

3. Redistribution over Income Classes

Most past studies of the redistributive effect of taxes and government expenditures, in both the U.S. and the U.K., have concentrated on redistribution over income classes. In order to examine such redistribution, it is necessary first to have some conception of an "original" distribution, before the redistribution actions in question have taken place. This will be a rather artificial concept, since, as discussed earlier, it is difficult even to guess what the distribution of income would have been in the absence of all taxes and government expenditures. Nevertheless, some baseline definition of income is needed in order to allow comparisons to be made, and for the purposes of this study we have chosen to use total household income before all taxes and benefits, which we have called original

[1]Since we did not have a measure of this cost, no expenditure was included for this item.

[2]For an elaboration of this argument see O'Higgins (1980).

income. Because this definition excludes transfer payments, and because there is some under-reporting of unearned and/or untaxable income in our data sources, original incomes as reported in the lowest two income classes are probably significantly less than actual incomes received. This should be borne in mind when examining the tables that follow.[3]

Table 1, which shows net benefits by decile of original income, summarizes taxes and expenditure benefits at both the federal and local levels ("local," as used here, refers to all governmental authorities other than the federal government, and includes state governments). Allowing for the anomalies which might be expected at the bottom end of the income scale, this table shows quite clearly that federal taxes tend to be quite proportional to income, and local taxes tend to fall somewhat as a proportion of income as income rises. Expenditures, on the other hand, behave quite differently. Expenditure benefits are a much larger proportion of income for those at the lower end of the income scale than for those in the higher deciles, and in fact both local and federal expenditure benefits decline steadily as a proportion of income through the income range. In fact, over much of the income range, the mean dollar amounts received by households in different deciles are very similar. Predictably, it is at the two extremes that this rule breaks down. The lowest two deciles receive somewhat lower federal expenditure benefits, on mean, than do the others, and the second decile (but, rather oddly, not the lowest) receives lower local expenditure benefits as well. Above the fifth decile, local expenditure benefits tend to rise slightly, in mean dollar amounts, with income, although the change is not large. Federal expenditure benefits remain almost constant until the highest decile, where they rise slightly. The reasons for these slight variations will be considered later when particular expenditures are examined in more detail.

Overall, these expenditures appear to vary much less with income than do taxes. As might, therefore, be expected, considerable redistribution between income classes appears to take place, on both the local and federal levels. Local net benefits are reasonably large and positive (i.e. benefits outweigh taxes) in the first seven deciles, and they become quite large and negative (i.e. taxes outweigh benefits) in the top two deciles. The same general pattern appears for federal net benefits, but these reach their peak in the third decile, and become negative in the sixth. Total net benefits, therefore, indicate a pattern of considerable redistribution towards the bottom five deciles, and away from the top three or four. Thus, the system as a whole appears to be quite redistributive.

As seen above, however, this overall pattern covers a number of small anomalies, particularly in the distribution of expenditures. Most of these can be explained with reference to the distribution of the specific expenditure items which make up the local and federal expenditure totals. The distribution of these expenditures, broken down by decile of original income, is therefore given in Tables 2 and 3.

[3]Calculations of tax and expenditure patterns by decile of disposable income have now been completed, and are available from the authors. The overall distribution pattern remains very similar, but there is some smoothing out of the curve in the 2nd and 3rd deciles.

TABLE 1

NET BENEFITS BY DECILE OF ORIGINAL INCOME: U.S. SUMMARY FIGURES

	All Categories	Lowest Decile	2nd Decile	3rd Decile	4th Decile	5th Decile	6th Decile	7th Decile	8th Decile	9th Decile	Highest Decile
Number of Households	69,240	7,030	6,860	7,090	6,920	7,020	6,930	6,780	6,920	6,790	6,900
Percentage	(100.0)	(10.2)	(9.9)	(10.2)	(10.0)	(10.1)	(10.0)	(9.8)	(10.0)	(9.8)	(10.0)
Mean Original Income (in dollars per year)	9,685	1,018	2,385	3,930	5,693	7,429	9,228	11,030	13,142	16,244	27,288
1. Local taxes	2,099	614	867	1,225	1,546	1,809	2,163	2,402	2,772	3,230	4,446
	(21.7)	(60.3)	(36.4)	(31.2)	(27.2)	(24.4)	(23.4)	(21.8)	(21.1)	(19.9)	(16.3)
2. Federal taxes	3,2541	765	951	1,321	1,864	2,455	3,150	3,708	4,457	5,489	8,518
	(33.6)	(75.2)	(39.9)	(33.6)	(32.7)	(33.0)	(34.1)	(33.6)	(33.9)	(33.8)	(31.2)
3. Local expenditures	2,515	2,344	1,700	2,365	2,158	2,199	2,608	2,563	2,859	3,089	3,161
	(26.0)	(230.3)	(71.3)	(60.2)	(37.9)	(29.6)	(28.3)	(23.2)	(21.8)	(19.0)	(11.6)
4. Federal expenditures	2,917	1,451	2,636	3,250	3,217	3,014	2,985	3,010	3,135	3,093	3,402
	(30.1)	(142.5)	(110.5)	(82.7)	(56.5)	(40.6)	(32.3)	(27.2)	(23.9)	(19.0)	(12.5)
5. Local net benefits	416	1,730	833	1,140	612	390	445	161	87	−141	−1,285
	(4.3)	(169.9)	(34.9)	(29.0)	(10.8)	(5.2)	(4.8)	(1.5)	(0.7)	(−0.8)	(−4.7)
6. Federal net benefits	−333	685	1,685	1,928	1,352	559	−165	−698	−1,322	−2.396	−5,115
	(−3.4)	(67.3)	(70.6)	(49.1)	(23.7)	(7.2)	(−1.8)	(−6.3)	(−10.1)	(−14.8)	(−18.7)
7. Total net benefits	83	2,415	2,518	3,068	1,964	949	280	−537	−1,235	−2,537	−6,400
	(0.9)	(237.2)	(105.6)	(78.1)	(34.5)	(12.8)	(3.0)	(−4.9)	(−9.4)	(−15.6)	(−23.5)

Notes: Row 1: Mean tax or expenditure benefit in dollars per year.
Row 2: (Figures in brackets) Mean tax or benefit as a percentage of mean income.
Percentages may fail to add to indicated sums due to rounding error.

TABLE 2

LOCAL EXPENDITURES BY DECILE OF ORIGINAL INCOME

	All Categories	Lowest Decile	2nd Decile	3rd Decile	4th Decile	5th Decile	6th Decile	7th Decile	8th Decile	9th Decile	Highest Decile
Mean Original Income (in dollars per year)	9,685	1,018	2,385	3,930	5,693	7,429	9,228	11,030	13,142	16,244	27,288
Schooling	715	192	171	417	548	694	895	996	1,035	1,131	1,098
	(7.4)	(18.9)	(7.2)	(10.6)	(9.6)	(9.3)	(9.7)	(9.0)	(7.9)	(7.0)	(4.0)
Higher education	217	478	180	94	172	124	168	172	232	237	306
	(2.2)	(47.0)	(7.5)	(2.4)	(3.0)	(1.7)	(1.8)	(1.6)	(1.8)	(1.5)	(1.7)
Highways	274	50	99	164	225	272	315	331	386	404	507
	(2.8)	(4.9)	(4.2)	(4.2)	(4.0)	(3.7)	(3.4)	(3.0)	(2.9)	(2.5)	(1.9)
Public assistance	271	158	530	873	285	207	190	137	129	119	46
	(2.8)	(15.5)	(22.2)	(22.2)	(5.0)	(2.8)	(2.1)	(1.2)	(0.9)	(0.7)	(0.2)
Health and hospitals	177	1,043	209	123	57	42	47	62	59	59	59
	(1.8)	(102.5)	(8.8)	(3.1)	(1.0)	(0.6)	(0.5)	(0.6)	(0.4)	(0.4)	(0.2)
Fire	36	16	19	27	31	35	42	42	46	51	53
	(0.4)	(1.6)	(0.8)	(0.7)	(0.5)	(0.5)	(0.5)	(0.4)	(0.4)	(0.3)	(0.2)
Police	115	50	61	89	102	113	132	134	147	156	164
	(1.2)	(4.9)	(2.6)	(2.3)	(1.8)	(1.5)	(1.4)	(1.2)	(1.1)	(1.0)	(0.6)
Unemployment	91	44	36	96	117	109	85	104	86	119	117
	(0.9)	(4.3)	(1.5)	(2.4)	(2.1)	(1.5)	(0.9)	(0.9)	(0.7)	(0.7)	(0.4)
Housing	37	47	75	82	79	44	13	6	6	7	6
	(0.4)	(4.6)	(3.1)	(2.1)	(1.4)	0.6)	(0.1)	(0.1)	—	—	—
Local unallocable	582	266	320	460	542	579	671	679	733	776	805
	(6.0)	(26.1)	(13.4)	(11.7)	(9.5)	(7.8)	(7.3)	(6.2)	(5.6)	(4.8)	(3.0)

Notes: Row 1: Mean expenditure benefit in dollars per year.
Row 2: (Figures in brackets)—Mean benefit as a percentage of mean original income for decile.

Table 2, which shows mean local expenditure (by type) by decile of original income, makes it clear that virtually all local expenditures have certain things in common. Almost all decline fairly steadily as a percentage of income as income rises—the only exceptions being schooling and higher education expenditures in the lowest deciles, which tend to be atypical due to the relatively large number of households consisting solely of students in the bottom decile, and solely of pensioners in the second and third. In spite of the general decline in expenditures as a proportion of income as income rises, however, there is a general rise in the absolute amount received as income rises. The exceptions to this rule are expenditures on housing and public assistance (which rise through the third decile and fall thereafter) and on health and hospitals, which are much higher in the lowest decile than in any other. The pattern of distribution of expenditures on health and hospitals largely reflects the fact that expenditures on public hospitals, which constitute most of this category, are allocated directly to patients, a high proportion of whom constitute impoverished single person households. The absolute decline in both public assistance and housing benefits may of course be attributed to the fact that both are generally subject to means test, and thus are not available to those with high incomes. Given that this is so, it may seem odd that neither benefit is, on average, equal to zero even in the highest income categories, but since the income categories given reflect income over a full year, the explanation may simply be that some households had incomes which varied considerably over the year, and so were eligible for means tested benefits for some part of the year in spite of relatively high annual incomes.

Local "unallocable" expenditures, which constitute the second largest category of local public expenditures, are distributed across households in much the same way as most of the other local public expenditures. Local "unallocables" consist of local public goods such as cost of local administration, local public utilities which are not run on a fee-for-service basis, local improvements such as street lighting, and so forth. These have been allocated on the basis of expenditures within local "State Economic Areas" as defined by the Department of Commerce.[4] The amount of local unallocable expenditure has been calculated separately for each SEA, on the basis of the information contained in the 1972 Census of Governments. Within an SEA "unallocable" expenditures have been distributed on the basis of population. The net result therefore is that overall those households located in SEAs with higher average expenditures on local public goods receive higher allocations of local unallocable expenditures, but that within any SEA the amount of local public goods allocation received is based entirely on the size of the household. Since the differences in spending between different SEAs are quite large, however, differences in location will account for a very large proportion of the variation in allocations of local public goods. It would appear from Table 2 that those households with higher incomes are generally located in SEAs with higher spending levels on local unallocable goods.

[4]According to the *County and City Data Book* (Dept. of Commerce, 1972) SEA's are "single counties or groups of counties which have similar economic and social characteristics. The boundaries of these areas have been drawn in such a way that each state is subdivided into relatively few parts, with each part having certain significant characteristics which distinguish it from adjoining areas."

TABLE 3

FEDERAL EXPENDITURES BY DECILE OF ORIGINAL INCOME

	All Categories	Lowest Decile	2nd Decile	3rd Decile	4th Decile	5th Decile	6th Decile	7th Decile	8th Decile	9th Decile	Highest Decile
Mean Original Income (in dollars per year)	9,685	1,018	2,385	3,930	5,693	7,429	9,228	11,030	13,142	16,244	27,288
Social security	718	367	1,345	1,448	1,119	801	484	466	411	379	339
	(7.4)	(36.1)	(56.4)	(36.8)	(19.7)	(10.8)	(5.2)	(4.2)	(3.1)	(2.3)	(1.2)
Agriculture	87	1	20	47	89	55	63	70	88	70	366
	(0.9)	(0.1)	(0.8)	(1.2)	(1.6)	(0.7)	(0.7)	(0.6)	(0.7)	(0.4)	(1.3)
Labor	7	—	—	1	3	5	7	8	10	13	18
	(0.1)	—	—	—	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Veterans' benefits	156	41	48	85	123	141	193	218	254	222	238
	(1.6)	(4.0)	(2.0)	(2.2)	(2.2)	(1.9)	(2.1)	(2.0)	(1.9)	(1.4)	(0.8)
Housing	36	52	78	76	76	43	13	7	6	6	6
	(0.4)	(5.1)	(3.3)	(1.9)	(1.3)	(0.6)	(0.1)	(0.1)	—	—	—
Education	45	95	35	20	38	25	37	37	50	54	64
	(0.5)	(9.3)	(1.5)	(0.5)	(0.7)	(0.3)	(0.4)	(0.3)	(0.4)	(0.3)	(0.2)
Welfare	33	18	66	102	34	23	29	21	15	8	7
	(0.3)	(1.8)	(2.8)	(2.6)	(0.6)	(0.3)	(0.3)	(0.2)	(0.1)	—	—
Highways	6	1	2	3	4	5	6	7	8	9	11
	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	—
Federal unallocable: Population	1,825	872	1,037	1,4634	1,725	1,913	2,149	2,185	2,2287	2,314	2,347
	(18.8)	(85.7)	(43.5)	(37.2)	(30.3)	(25.8)	(23.3)	(19.8)	(17.4)	(14.2)	(8.6)
Federal unallocable: Income	1,842	109	379	707	1,080	1,429	1,787	2,142	2,549	3,096	5,245
	(19.0)	(10.7)	(15.9)	(18.0)	(19.0)	(19.2)	(19.4)	(194)	(19.4)	(19.1)	(19.2)
Federal unallocable: Capital income	1,815	1,275	1,4216	1,355	1,176	1,178	1,411	1,634	2,047	2,581	4,127
	(18.7)	(125.2)	(59.4)	(34.5)	(20.7)	(15.8)	(15.3)	(14.8)	(15.6)	(15.9)	(15.1)

Notes: Row 1: Mean expenditure benefits in dollars per year.
Row 2: (Figures in brackets)—Mean benefit as a percentage of mean original income for decile.

Table 3 shows the detailed allocations of federal expenditures by income. Like local public expenditures, total federal expenditures fall as a percentage of income as income rises. Although mean total federal benefits start out less in the lowest income class than do the mean local expenditures benefits, they rise more rapidly in the first few income classes. Thus, those in the lowest income class receive well over half their total expenditure benefits from local governments, but those in the next four income classes receive much more from the federal government. In the highest three income classes, amounts received from the two sources are nearly equal. As with all of the individual local expenditure items, individual federal expenditures all fall as a percentage of income as income rises. Among federal expenditures, however, there are several which also fall as an absolute amount with rising income. Among these are expenditures on social security benefits, on housing, on education, and on welfare. All these fall from the second lowest category on, although some rise between the first and second categories.

Aside from unallocable expenditures, the largest category of federal expenditure is expenditure on social security benefits. These benefits are greatest, as seen above, in the lowest income classes, although less in the lowest class than in the three or four immediately above it. Still, social security payments add almost 40 percent to the original income of those in the lowest class, and more than half to the original income of those in the second lowest class.

Aside from these two categories, no other category of federal expenditure accounts for more than two percent of total income. The only other categories which make significant contributions to total income in any income class are expenditures on housing and on education, which largely go to the lowest income classes and constitute a relatively high percentage of income for these classes. Since education expenditures by the federal government are almost all to college-age and older students, distribution of these benefits is similar to the distribution of local expenditure on college-age students. These benefits are allocated to the students themselves, who largely constitute one person households in the lowest income bracket. Thus expenditures of this type tend to be very heavily concentrated in that bracket.

Since over a third of all federal expenditures fall into the unallocable category, it is necessary to consider how these expenditures can best be distributed among households. These expenditures are on items such as national defense, general administration, etc., which cannot be directly attributed to households. Three different methods of allocation, reflecting differing views as to the impact of such expenditures, have been examined here. The first assumption, distribution by population, reflects the view that since the goods in question are pure public goods, all members of the population benefit equally from them. The second method, allocation by total income, reflects the view presented by Aaron and McGuire (1970), who argue that if the marginal utility of income declines as income rises, the relative utility of public goods will rise with income. The third method, allocation by capital income, rests on the assumption that many public expenditures, such as expenditures for police and for fire protection on the local level, are made at least partly to protect property, and are therefore of more benefit to owners of property than to others. Unfortunately, we have no informa-

tion on total household wealth, and have had to use capital income as a proxy for it.

As may be seen, the population distribution is much more heavily weighted towards the lowest income group than is the distribution by total income. The distribution by capital income, however, does give a relatively large benefit to the lowest two groups, since they receive a disproportionate amount of their income from capital. It is necessary to keep in mind that total original income in these two groups is very low, and therefore even a small amount of capital income will constitute a large percentage of total income. To the extent that these groups include the elderly and others who may have some unearned income, the proportion, if not the amount, of their income which is unearned may be fairly large. In spite of this, however, both the distribution by total income and the distribution by capital income result in a larger proportion of benefits going to those with incomes over $15,000. Distribution by total income, in particular, results in much larger benefits to those with higher incomes. If the benefits of these expenditures were to be distributed in this way for the net benefit calculation, federal net benefits would virtually disappear for the lowest group, and net losses would be cut in half for the two highest groups. This would result in a much less redistributive distribution of net benefits.

In summary, then, the pattern of expenditures on both the local and federal levels indicates strongly that while there is some correlation between income and expenditure benefits received, other factors play a much larger part in determining expenditure benefits than does household income. In general, expenditure benefits fall as a proportion of income, but rise in absolute amount with rising income. As we have seen, however, a high proportion of expenditure benefits depend very heavily on household size rather than household income. Therefore, in the next section we examine the effect of household size on the distribution of local and federal expenditures.

4. Redistribution by Household Size

The suggestion that family size may be a better indicator of total expenditure benefits than income class is largely confirmed by Table 4. Both local and federal expenditures rise dramatically with household size for all households composed of two or more members; interestingly, however, both are a much higher proportion of income in one person households than they are in all but the very large households. This is, of course, partly due to the low average incomes of one person households, but this cannot be the entire explanation. For both local and federal expenditures, the relatively large benefits which go to those in this class are probably a result of the large numbers of elderly persons, single students, and others who receive unusually high levels of transfer payments and services due to a semi-dependent status. In fact, over 40 percent of those in one person households are in the lowest income class, and another quarter are in the second lowest class.

Aside from one person households, however, expenditure benefits rise steadily with household size. This is true for both local and federal expenditures, but the rise in local expenditures, from 14 percent of income for two person households to 70 percent of income for households with eight or more members, is

TABLE 4

NET BENEFITS BY HOUSEHOLD SIZE

Mean Tax or Benefit (in dollars per year)	All Categories	Number of Persons in Households							
		1	2	3	4	5	6	7	8+
Households (thousands)	69,240	16,957	18,745	10,914	9,819	6,183	3,357	1,900	1,365
% of All Households	(100.00)	(24.5)	(27.1)	(15.8)	(14.2)	(8.9)	(4.8)	(2.7)	(2.0)
Mean Original Income (in dollars per year)	9,685	3,806	9,560	11,580	12,698	13,330	13,404	12,972	12,614
Local taxes	2,099	836	1,772	2,354	2,794	3,213	3,532	3,783	4,225
	(21.7)	(22.0)	(18.5)	(20.3)	(22.0)	(24.1)	(26.4)	(29.2)	(33.5)
Federal taxes	3,251	1,311	2,835	3,813	4,396	4,833	5,049	5,133	5,396
	(33.6)	(34.4)	(29.7)	(32.9)	(34.6)	(36.3)	(37.7)	(39.6)	(42.8)
Local expenditures	2,515	1,286	1,427	2,245	3,218	4,436	5,604	6,935	8,850
	(26.0)	(33.8)	(14.9)	(19.4)	(25.3)	(33.3)	(41.8)	(53.5)	(70.2)
Federal expenditures	2,917	1,622	2,861	2,929	3,220	3,880	4,580	5,302	6,603
	(30.1)	(42.6)	(29.9)	(25.3)	(25.4)	(29.1)	(34.2)	(40.9)	(52.3)
Local net benefits	416	450	−345	−109	424	1,223	2,072	3,152	4,625
	(4.3)	(11.8)	−(3.6)	−(0.9)	(3.3)	(9.2)	(15.5)	(24.3)	(36.7)
Federal net benefits	−333	310	26	−884	−1,175	−954	−470	169	1,207
	−(3.4)	(8.1)	(0.3)	−(7.6)	−(9.3)	−(7.2)	−(3.5)	(1.3)	(9.6)
Total net benefits	83	760	−319	−993	−751	269	1,602	3,321	5,832
	(0.9)	(19.9)	−(3.9)	−(8.5)	−(6.0)	(2.0)	(12.0)	(25.6)	(46.3)

Notes: 1. Figures in brackets are mean taxes or benefits as a percentage of mean original income for category.
2. Figures may not sum correctly due to rounding errors.

even more dramatic than the rise in federal expenditure benefits. Both local and federal taxes rise somewhat with household size as well, but the rise is not nearly so great as the rise in expenditure benefits. As a result, average net benefits on both the local and federal levels are negative for smaller family sizes, but become positive for very large family sizes. One person households are again an exception, since they have positive net benefits on both the local and federal levels. Two member households have federal net benefits that are very slightly positive, but these are more than outweighed by their negative local net benefits. Local net benefits become positive on average for households with more than four members, whereas federal net benefits are on average negative for households with fewer than seven members. On mean, households with five or more members are likely to have positive total net benefits, while those with fewer members are likely to have negative benefits.

Tables 5 and 6 show the way local and federal expenditures are individually distributed among households of different sizes. As might be expected, Table 5, which shows local expenditure by family size, indicates that for one person households the two largest categories of local expenditure benefits are expenditures on higher education and on public assistance. Since higher education benefits go only to households which reported a member attending an institution of higher education, the relatively high mean benefit for one person households from these expenditures indicates that a very high proportion of these households must consist of single students. Mean public assistance benefits for those in one person households are also relatively high, although in this case not as high as benefits for those in larger households. None the less, public assistance benefits are the largest single class of benefits received by those in one person households. Since those in one person households are not eligible for many types of public assistance, this may be something of a surprise. As has been seen, however, one person households tend to have very low mean incomes, and would certainly be eligible for some local public assistance benefits such as food stamps.

Aside from one person households, local public expenditure benefits are distributed very much in the way that one would expect. Benefits from expenditure on schooling rise very sharply with family size, so that benefits for households with eight or more members are over ten times those received by households with only three members. Public assistance benefits are fairly stable for households with less than four members, but rise quite rapidly thereafter, and are particularly high for households with seven or more members. Most other expenditure benefits rise somewhat with family size, but seem to remain more or less proportional to income. Aside from schooling and public assistance, the only local expenditure to form more than three percent of income in any household size category are the expenditures classed as local unallocable expenditures. As discussed earlier, these expenditures have been allocated on the basis of household size to households in the local area in which the expenditures were made. Although these expenditures do rise as a proportion of income as family size rises, the amounts themselves seem to be almost directly proportional to family size overall. This would indicate that there is no very large tendency for those with larger households to live within local areas which spend either more or less than the average on local public goods.

TABLE 5

LOCAL EXPENDITURE BY HOUSEHOLD SIZE

	All Categories	Household Size							
		1	2	3	4	5	6	7	8+
Mean Original Income (in dollars per year)	9,685	3,806	9,560	11,580	12,698	13,329	13,404	12,972	12,614
Schooling	715	21	44	411	1,097	1,893	2,655	3,402	4,446
	(7.4)	(0.6)	(0.5)	(3.5)	(8.6)	(14.3)	(19.8)	(26.2)	(35.2)
Higher education	217	269	146	256	255	257	231	239	224
	(2.2)	(7.0)	(1.5)	(2.2)	(2.0)	(1.9)	(1.7)	(1.8)	(1.8)
Highways	274	92	276	340	367	383	381	361	369
	(2.8)	(2.4)	(2.9)	(2.9)	(2.9)	(2.9)	(2.8)	(2.8)	(2.8)
Public assistance	271	297	213	271	238	322	485	723	1,086
	(2.8)	(7.8)	(2.2)	(2.3)	(1.9)	(2.4)	(3.6)	(5.6)	(8.6)
Health and hospitals	177	261	141	92	112	150	164	247	291
	(1.8)	(6.9)	(1.5)	(0.8)	(0.9)	(0.9)	(1.2)	(1.9)	(2.3)
Fire	36	13	25	38	50	63	74	87	104
	(0.4)	(0.3)	(0.3)	(0.3)	(0.4)	(0.5)	(0.6)	(0.7)	(0.8)
Police	115	40	79	119	158	197	234	271	330
	(1.2)	(1.1)	(0.8)	(1.0)	(1.2)	(1.5)	(1.7)	(2.1)	(2.6)
Unemployment	91	30	59	89	118	148	175	205	255
	(0.9)	(0.8)	(0.6)	(0.8)	(0.9)	(1.1)	(1.3)	(1.6)	(2.0)
Housing	37	59	41	340	23	22	22	27	27
	(0.4)	(1.6)	(0.4)	(0.3)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)
Local unallocable	582	204	403	599	800	1,001	1,183	1,373	1,717
	(6,0)	(5.4)	(4.2)	(5.2)	(6.3)	(7.5)	(8.8)	(10.6)	(13.6)

Notes: Row 1: Mean benefit in dollars per year.
Row 2: (Figures in brackets)—Mean benefit as a percentage of mean original income for category.

TABLE 6

FEDERAL EXPENDITURES BY HOUSEHOLD SIZE

	All Categories	Household Size							
		1	2	3	4	5	6	7	8+
Mean Original Income (in dollars per year)	9,685	3,806	9,560	11,580	12,698	13,329	13,404	12,972	12,614
Social security	718	783	1,270	627	296	296	333	438	395
	(7.4)	(20.6)	(13.3)	(5.4)	(2.3)	(2.2)	(2.5)	(3.4)	(3.1)
Agriculture	87	19	94	101	95	120	141	128	124
	(0.9)	(0.5)	(1.0)	(0.9)	(0.7)	(0.9)	(1.1)	(1.0)	(1.0)
Labor	7	2	7	9	10	10	10	10	9
	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Veterans' benefits	156	48	142	201	215	218	225	207	219
	(1.6)	(1.3)	(1.5)	(1.7)	(1.7)	(1.6)	(1.7)	(1.6)	(1.7)
Housing	36	58	42	29	23	22	23	26	27
	(0.4)	(1.5)	(0.4)	(0.3)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)
Education	45	54	30	53	54	54	49	51	47
	(0.5)	(1.4)	(0.3)	(0.5)	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)
Welfare	33	36	25	32	28	38	58	85	132
	(0.3)	(0.9)	(0.3)	(0.3)	(0.2)	(0.3)	(0.4)	(0.7)	(1.0)
Highways	6	2	6	8	8	9	9	8	8
	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Federal unallocable: Population	1,825	620	1,246	1,869	2,490	3,112	3,732	4,350	5,642
	(18.8)	(16.3)	(13.0)	(16.1)	(19.6)	(23.3)	(27.8)	(33.5)	(43.7)
Federal unallocable: Income	1,842	692	1,859	2,228	2,427	2,520	2,495	2,356	2,227
	(19.0)	(18.2)	(19.4)	(19.2)	(19.1)	(18.9)	(18.6)	(18.2)	(17.6)
Federal unallocable: Capital income	1,815	1,101	1,390	1,902	2,202	2,667	3,077	3,625	4,039
	(18.7)	(28.9)	(14.5)	(16.4)	(17.3)	(20.0)	(23.0)	(27.0)	(32.0)

Notes: Row 1: Mean benefit in dollars per year.
Row 2: (Figures in brackets)—Mean benefit as a percentage of mean original income for category.

Table 6 shows that the pattern for federal unallocable expenditures is similar to the local expenditure pattern. Again, expenditure benefits received by one person households considerably outweigh, as a proportion of total income, those for other small households and again this is due primarily to a small number of individual expenditure items. In the case of federal expenditures most of the relatively high benefit levels seen in one person households are attributable to social security expenditures. This confirms the view that many of the persons in this category are elderly pensioners, whose major source of income is likely to be government pensions. Social security benefits are also very high for households with two members, but they fall off very rapidly thereafter. Since most recipients of social security payments are retired persons who live alone or with a relative, this is the pattern that one would expect to see.

Aside from social security expenditures, no category of allocable federal expenditure forms a very large portion of income for households of any size. Expenditure in most of the remaining categories is fairly evenly distributed over the range of household sizes. In most expenditure categories expenditure grows slightly but not dramatically with household size, and thus remains approximately proportional to income. For households with more than two members the largest single category is the unallocable expenditures category. Again, as with the distributions by income, this has been distributed in three ways. As might be expected, the distributions by population result in expenditure levels that are a rising proportion of income as family size rises and which for the largest family groups form a very large proportion of income indeed. If federal unallocable expenditures are allocated by income, however, the pattern is very different. For families with four or fewer members, the amounts expended as a proportion of income are very similar using this assumption to those seen using the assumption that these expenditures should be allocated by the population. As family size rises however, expenditure levels remain fairly constant, and even fall slightly on mean when allocated by income, rather than rising dramatically as they do when allocated by population. The third possible allocation assumption, that these expenditures should be allocated by capital income, results in very high expenditure levels for single person households, for whom, as we have seen, capital income may be a very large proportion of income even though it may be a relatively small amount. After the first household size category, however, the allocation of expenditures by capital income results in a fairly similar distribution to the allocations by population, although the benefit levels reached in the last three or four household size groups do not rise as dramatically as they do in the population allocation.

In summary, then, federal expenditures other than social security expenditures and unallocable expenditures seem to be fairly proportional to income across household size classes. Social security expenditures are quite large in one and two person households and fall off very rapidly thereafter. Since these are the largest single category of allocable federal expenditures by a fairly large margin, their pattern tends to dominate the overall pattern of allocable federal expenditures. Unallocable expenditures may be distributed in a number of different ways, but, as we have seen, all of these result in fairly similar benefits levels for

households with two to five members and produce major variations only for very large or very small households.

Related to the question of expenditure benefits and family size is the question of benefits and number of earners in the household. Larger households tend to have larger incomes at least partly because they often tend to have more workers. Many of the one person households seen in the last three tables have no earners, and a high proportion of the larger households will have two or more earners. Table 7 explores the differences in taxes paid and benefits received by numbers of workers and by the marital status of the head of household. As may be seen, the proportion of income paid in taxes is almost identical for single earner, married one earner, and two earner households. Since average income is higher for married one earner households than for single earners and is higher still for two earner households, the absolute amount of tax paid is higher for these groups. It is not as much greater, however, as it would be if it reflected the statutory progressivity of the income tax structure. One of the reasons for the lack of progressivity seen here may be that taxes are lower for a married couple than for single people unless both members of the couple are working and earning highly similar salaries.[5] Given that men's salaries are on average almost twice women's, it is probably the case that in most two earner households the salary of one of the earners is significantly higher than that of the other.

The expenditure system, on the other hand, does not follow the same pattern as the tax system. Single workers and those in one earner couples receive considerably more expenditure benefits than two earners. This is probably partly due to differences in average income, but this cannot be the entire explanation, since standardization by income has relatively little effect on proportion of income spent in taxes. Income, however, does very strongly affect expenditure benefits received. In the lowest three deciles of income only those who are married can expect to receive the very high benefits, as a proportion of income, which are generally characteristic of these classes. The one earner couple, even in this group, is the most likely to benefit, although two earner couples also do reasonably well. In the middle four deciles, the pattern of relatively high expenditure benefits for one-earner couples continues. Federal expenditures in particular seem to favor this group. Two earner couples again do slightly better than single earners, but less well than one earner couples. In terms of net benefits, in fact, the one earner couple is the only group in these income classes that does not suffer a net loss on mean. The pattern in the highest income classes differs from that in the other two; all members of these classes pay approximately the same amount in taxes and receive proportionately the same benefits. This is the one group in which marital status seems to make very little difference. Of course, marital status is not the sole explanation of these results since one earner couples, particularly at lower income levels, may be more likely to have young children; this may both account for there only being one earner, and explain why they receive higher expenditure benefits.

[5]It should be noted, however that effective rates of income tax alone are slightly progressive: single earners pay in income tax an average of $13\frac{1}{2}$ percent of their income, while one earner couples pay 14 percent and two earner couples about $14\frac{1}{2}$ percent.

TABLE 7

NET BENEFITS BY NUMBER OF EARNERS IN HOUSEHOLDS

Mean Tax or Benefit (in dollars per year)	All Households	Number of earners in household: No Earners	1-Unmarried Earner	1-Married Earner*	2 Earners	3 or More Earners
Households (thousands)	69,240	19,340	9,290	20,910	16,050	3,650
% of all households	(100.0)	(27.9)	(13.4)	(30.2)	(23.2)	(5.3)
Mean Original Income	9,685	4,334	7,000	11,342	13,630	18,036
Local taxes	2,099	1,155	1,406	2,482	2,748	3,809
	(21.7)	(26.6)	(20.1)	(21.9)	(20.2)	(21.1)
Federal taxes	3,251	1,431	2,260	3,819	4,573	6,344
	(33.6)	(33.0)	(32.3)	(33.7)	(33.6)	(35.2)
Local expenditures	2,515	2,439	1,576	2,618	2,671	4,021
	(26.0)	(56.3)	(22.5)	(23.1)	(19.6)	(22.3)
Federal expenditures	2,917	3,017	1,982	3, 091	2,902	3,839
	(30.1)	(69.6)	(28.3)	(27.3)	(21.3)	(21.3)
Local net benefits	416	1,284	170	136	−77	212
	(4.3)	(29.6)	(2.4)	(1.2)	(−0.6)	(1.2)
Federal net benefits	−333	(1,586	−278	−728	−1,670	−2,505
	(−3.4)	(36.6)	(−4.0)	(−6.4)	(−12.3)	(−13.9)
Total net benefits	83	2,870	−108	−592	−1,747	−2,293
	(0.9)	(66.2)	(−1.6)	(−5.2)	(−12.8)	(−12.7)

Notes: 1. Figures in brackets are mean taxes or benefits as a percentage of mean original income for category.
2. Figures may not sum correctly due to rounding error.

*"1-married earner" refers to households with one earner who is married with spouse present.

It would appear then, that, expenditure patterns do not offset the advantage that married people and particularly one earner couples receive under the tax laws. Even though couples in general have a higher average income than single people, the benefits they receive from expenditures are higher on average than those received by single earners. There seems to be no single expenditure which accounts for this pattern amongst either federal or local expenditures, but overall the relatively high benefit levels seen for households headed by married couples reflect their larger average size.

5. Distributions by Race and Sex of Head of Household

So far we have concentrated on redistribution by income class and by household size. Both of these are factors which have a direct effect on taxes and on expenditure benefits in both Britain and the U.S., and as such they are of interest. As discussed in the introduction, however, using a microdata file such as this one, it is possible to consider the impact of other types of variables on redistribution. Household characteristics other than income and size may also be correlated with differences in taxes paid and benefits received. This may be true even when there is no legislative intent that such differences should exist, either because of correlations between these characteristics and others which do directly influence benefits, or because of differences in administration of tax and benefit programs which cause them to affect households in different social and demographic categories differently.

In this section, we examine the influence of race and sex of household head on taxes paid and benefits received, as an illustration of the type of analysis of the redistributive impact of such social and demographic variables which is possible using a microdata sample of this kind.

Table 8 summarises net benefits by race and sex. As can be seen, there are indeed extremely large differences in both taxes and benefits for different race/sex groups. Households headed by non-whites and females pay somewhat more taxes than do those headed by white males, but they receive very substantially higher benefits. This pattern seems to affect female-headed households rather more than those headed by males, even non-white males. Households headed by black females are the most extreme examples. These households receive benefits which are three to four times as large a proportion of their income as are the benefits received by white male headed households, and the percentage of their income paid in taxes is, at least on the local level, about 50 percent higher. As the average amounts given show, however, the actual amount of money paid or received by non-white female-headed households is in all but one case considerably less than the amounts for white male-headed households. The exception is local expenditure benefits, which are higher on average for households headed by both non-white females and non-white males than for white male-headed households.

Although both expenditure benefits and taxes are a larger proportion of income for households not headed by white males, in every case the increase in benefits outweighs the increase in taxes. Thus, total net benefits are negative on average only for households headed by white males. All other household types

TABLE 8

NET BENEFITS BY RACE AND SEX OF HOUSEHOLD HEAD

	Race and Sex of Household Head				
	Total	White Male	Non-White Male	White Female	Non-White Female
Number of households	69,240	48,020	5,520	13,290	2,410
Mean household income	9,685	11,304	7,893	5,125	4,207
Net benefits					
Local taxes	2,099	2,400	1,949	1,220	1,309
	(21.7)	(21.2)	(24.7)	(23.8)	(31.1)
Federal taxes	3,251	3,804	2.771	1,747	1,630
	(33.6)	(33.7)	(35.1)	(34.1)	(38.7)
Local expenditures	2,515	2,516	2,848	2,159	3,899
	(26.0)	(22.3)	(36.1)	(42.1)	(92.7)
Federal expenditures	2,918	3,082	2,845	2,425	2,535
	(30.1)	(27.3)	(36.1)	(47.3)	(60.3)
Local net benefit	416	116	899	939	2,590
	(4.3)	(1.0)	(11.4)	(18.3)	(61.6)
Federal net benefit	−333	−722	74	678	905
	−(3.4)	−(6.4)	(0.9)	(13.2)	(21.5)
Total net benefit	83	−606	973	1,617	3,495
	(0.09)	−(5.4)	(12.3)	(31.6)	(83.1)

Notes: Row 1: Mean burden or benefit per household in dollars.
Row 2: (Figures in brackets)—Mean burden or benefit as a percentage of mean income for category.

have, on average, positive net benefits which are lowest, both absolutely and in relation to income, for non-white males and highest for non-white females.

If local and federal expenditures are broken down into their component parts, it becomes clear that the results seen above are largely due to a few specific expenditure items.[6] For example, much the largest single benefit for non-white female-headed households is public assistance, which adds nearly 40 percent to original income for those in this category. Public assistance is also very important for white female-headed households, adding more than 10 percent to original income. It should be emphasized that all female-headed households have very low mean household incomes compared to male-headed households. Even so, the amount of public assistance received by non-white female-headed households is nearly four times that received by non-white male-headed households, and over ten times as much as that received by white male-headed households.

Apart from public assistance several other categories of expenditure also show significant differences between household types. School expenditures are very similar in absolute amount (although not, of course, as a percentage of

[6]The results discussed here and in the next several pages are not shown in tabular form. Complete tables may be obtained from the authors.

income) across household types, with the exception of households headed by white females, which receive very low schooling benefits. This almost certainly reflects an absence of school age dependents in households of this type. Expenditures on highways allocated to households form a slightly smaller proportion of income for non-white headed households and are, of course, considerably smaller in absolute amount. This undoubtedly reflects the much lower incidence of car ownership among those non-white or female-headed households. Hospital expenditures, on the other hand, are very heavily weighted towards those in non-white and especially female-headed households. Since hospital expenditures have been allocated to those who actually reported hospital care within a public hospital during the survey year (although totals have been boosted somewhat to account for under-reporting) it seems fairly likely that the relatively high hospital expenditures allocated to female-headed households reflect the relatively large numbers of low-income and especially elderly women who may be spending significant amounts of time in public hospitals. Unemployment insurance, on the other hand, although it forms a slightly larger proportion of income for non-white headed households, is fairly comparable in amount across the categories, with white females receiving somewhat less and non-white males receiving somewhat more. The larger average amounts received by non-white males undoubtedly reflect a higher incidence of unemployment. In the case of non-white females this is probably offset to some extent by their very low mean incomes, and their tendency to be in occupations which are not covered. Since unemployment benefits operate on an insurance principle, benefits will, of course, be related to the amounts contributed and hence the amount earned. The low level of benefits received by white females probably reflects both a relatively low unemployment rate, compared to non-white household heads, and also a low mean income. As will be seen, a high proportion of white female household heads are not economically active, since these households tend to consist of single female pensioners.

Housing also shows some differences over race and sex groups, both in absolute amount and as a percentage of income. Once again, benefits are higher for female-headed households than for male-headed households, and for non-white headed households than for white-headed households. The benefits allocated here equal the amount spent on public housing by state and local authorities in the year in question. These were allocated on the basis of reported housing tenure, so that the amounts shown reflect overall differences in the tenure of public housing. Once again, since there are income cut-offs for many types of public housing, the very low mean incomes of female-headed households probably have some bearing on their relatively greater likelihood of becoming tenants of public housing. The question of the effects of the correlation between income and race and sex of head of household as a determining feature of the differences between these different household types will be discussed in greater detail later in this section.

Local unallocable expenditures are quite similar in amount for all male-headed households, but white female-headed households receive local unallocable benefits which are only slightly over half as high. This is again probably largely due to the relatively small size of these households. Interestingly, non-

white female-headed households also have somewhat lower benefits than male-headed households ($530 on average, as opposed to $654 average over all male-headed households) although these households are not smaller on average than male-headed households. Since local unallocable benefits are divided on the basis of family size within each local jurisdiction, this would tend to imply that those local jurisdictions with a high concentration of non-white female-headed households are also likely to have lower local public expenditures which fall into the unallocable category. This probably reflects a lower local level of public expenditure in general, related to lower mean incomes in the area. It is possible, however, that this difference simply reflects differences in the breakdown of public expenditure in different areas, with more public expenditure going to allocable expenditures in those areas with a high concentration of non-white female-headed households.

There are also striking differences in the allocation of specific federal expenditures over household types. The most obvious of these is the very large average expenditure benefits from Social Security received by white female-headed households—on average, about $1,140, or over 22 percent of their original incomes. This confirms the view that a very high proportion of these households consist of unmarried (probably widowed) women over 65, who are Social Security beneficiaries. Social Security benefits are also a relatively large percentage of original income (about 14 percent) for non-white female-headed households, although the mean amount received by these households is comparable to the mean amount received by male-headed households.

Among other types of benefits, it is noticeable that veterans' benefits, not surprisingly, are much more likely to go to male-headed households, while federal housing expenditures, like local housing expenditures, are more likely to go to female-headed households. The same is true for federal welfare expenditures, with those going mainly to female, and especially non-white female-headed households. Finally, the federal unallocable category once again reflects the differences in the size distribution of households.

For both federal and local expenditure benefits, many of the results may be a product of the correlation between race and sex of head of household and income. The same may hold on the tax side, with the correlation working in the opposite direction so that net benefits are doubly affected. Thus it may be the case that white male-headed households pay high taxes not because they are headed by white males but rather because they have high incomes. Similarly, black female-headed households may receive large benefits because they tend to have very low incomes and, often, many dependents. These possibilities can be examined with reference to Table 9 which shows differences in benefits by race and sex standardized by income. As may be seen, many of the differences found in Table 8 persist. In particular, in the low income class, non-white female-headed households still pay a much larger percentage of income in the form of taxes than do white male-headed households. Since the actual amounts paid are fairly close, however, this difference may be due to remaining differences in income. More interestingly, white female-headed households for some reason pay a somewhat smaller amount of local taxes than do the other types of household. This seems to be largely because these households tend to pay lower property taxes than do the

TABLE 9

NET BENEFITS BY RACE AND SEX OF HOUSEHOLD HEAD AND INCOME CATEGORY

	Low Income*				Medium Income*			
	White Male	Non-White Male	White Female	Non-White Female	White Male	Non-White Male	White Female	Non-White Female
Number of Households	11,690	2,150	9,060	1,890	25,120	2,430	3,670	470
Net benefits								
Local taxes	1,081	1,081	861	1,016	2,309	2,353	1,828	2,276
	(33.3)	(35.9)	(33.5)	(41.2)	(22.0)	(25.1)	(20.4)	(25.2)
Federal taxes	1,145	1,190	1,093	1,116	3,474	3,341	2,784	3,157
	(35.3)	(39.5)	(42.6)	(45.3)	(33.1)	(35.6)	(31.0)	(34.9)
Local expenditures	(1,899	2,576	2,172	3,704	2,642	2,475	2,132	4,070
	(58.6)	(85.5)	(84.6)	(150.2)	(25.2)	(37.0)	(23.7)	(45.0)
Federal expenditures	2,945	2,365	2,209	2,238	3,064	3,260	2,800	3,777
	(90.9)	(78.5)	(86.0)	(90.8)	(29.2)	(34.7)	(31.2)	(41.8)
Local net benefit	819	1,495	1,311	2,688	333	1,122	304	1,794
	(25.3)	(49.6)	(51.1)	(109.0)	(3.2)	(11.9)	(3.4)	(19.8)
Federal net benefit	1,799	1,175	1,117	1,122	−410	−8.1	16	619
	(55.5)	(39.0)	(43.5)	(45.5)	−(3.9)	−(0.8)	(0.2)	(6.8)
Total net benefit	2,618	2,670	2,428	3,809	−77	1,041	320	2,413
	(80.8)	(88.6)	(94.5)	(154.5)	−(0.7)	(11.1)	(3.7)	(26.7)

Notes: Row 1: Mean burden or benefit per household in dollars.

Row 2: (Figures in brackets)—Mean burden or benefit as a percentage of mean income for category.

*In this table, low income means incomes of less than $6,000, while medium income means income between $8,000 and $12,000. Higher income groups were not examined because of the low numbers of nonwhite female-headed households in these categories.

other types of households. Given the way the property tax is allocated, this must reflect generally lower housing costs for this group. This may be a reflection either of their small average size, or of the fact that a relatively large proportion of those in this category are pensioners, since a higher proportion of this group may be owner-occupiers who own their homes outright.

Much more striking than the differences in taxes, however, are the differences in public expenditures. Again, non-white female-headed households receive much higher local expenditure benefits than do other types of households, even within the same income class. This is true whether expenditures are considered as an absolute amount or as a proportion of income. Again, this may be partly due to remaining differences in income, but it seems very unlikely that this could be the entire explanation. Local expenditure benefits, in particular, are much more likely to go to households headed by non-white females than to any other category. It might be argued that this is partly due to the large average number of dependents in households headed by non-white females; however, households headed by non-white males have at least as many (see Table 10). It is also possible that social

TABLE 10

FAMILY SIZE BY RACE AND SEX: PERCENTAGE OF FAMILIES IN RACE–SEX GROUP

	White Male	Non-White Male	White Female	Non-White Female
Total number	48,020	5,520	13,290	2,410
Family size				
One	12.6	22.8	63.4	41.5
Two	30.5	20.8	19.9	17.8
Three	17.4	15.4	7.8	11.6
Four	18.2	11.4	5.2	11.2
Five	10.9	12.7	1.9	5.8
Six	5.8	7.1	1.0	5.4
Seven	2.9	4.7	0.6	5.0
Eight or more	1.8	5.1	0.3	1.7
Percent with three or more non-adult dependents	21.4	29.6	9.0	29.1

service agencies which handle the provision of income for these very low income households may be better equipped to find and to deal with households headed by non-white females, or may be more likely to exist in areas where these households are. Female-headed households, which cannot by definition be two-parent households, are more likely to be eligible for some types of local public expenditures, such as aid to families with dependent children. Further information on the extent to which factors such as the existence of local services affect the

distribution of local expenditure benefits between household types could be obtained by considering urban versus rural residence as well as income class in relation to the different household types. This is done later in this section when discussing Table 11.

Federal expenditure benefits show a different pattern by race and sex and income class than do local expenditure benefits. Federal expenditures are highest on average for white female-headed households. These benefits are about the same proportion of income for all types of households in the lowest income class, with the exception of those headed by non-white males. The difference is, however, neither very large nor very significant, statistically.

Thus, for the low income class, although stratification by income has modified the pattern somewhat, the differences seen earlier tend to persist. The second half of Table 9 shows that these differences also characterise the medium income class. Although both taxes paid and the proportion of income paid in taxes is quite similar for all types of households, non-white female-headed households once again receive considerably higher expenditure benefits than do other types of households. In this case, this is almost certainly not due to lower average income, since average income is very similar for all household types in this class. Nonetheless, non-white female-headed households, and, to a lesser extent, households headed by non-white males, receive expenditure benefits that are higher, both as an average amount and as a proportion of income, than do households headed by whites. Again, it is not entirely clear why this should be so. Possible explanations might be that these households have a larger number of dependents, that they are more likely to be established in areas with a high level of social service expenditures, or that for some reason such expenditures are more easily accessible to them. Information on the first two of these possibilities is included in Tables 10 and 11.

Table 10 shows family size for each race and sex class. Probably the most striking thing about this table is the very large proportion of female-headed households which consist of one member only. As mentioned earlier, this reflects the fact that women, on average, live longer than men, so that there are large numbers of widowed women living alone. Almost two-thirds of white female-headed households fall into this category. Since larger households tend to receive more benefits, especially local benefits, a large proportion of which have to do with the number of children in the household, this figure does much to explain the relatively low local expenditure benefits received by white females.

Apart from this finding, the other finding of interest is that approximately 30 percent of all households headed by non-whites have three or more non-adult dependents. This contrasts with about 21 percent of white male-headed households, and only 9 percent of white female-headed households. On the other hand, white male-headed households are also less likely to consist of a single member than any other category of household. Thus, the mean number of household members is very similar for households headed by non-whites and for those headed by white males. To the extent that benefits are determined by the number of non-adult dependents, however, rather than by household size alone, the relatively large number of children in non-white headed households is an important factor in explaining the relatively high benefits they receive. Thus, for

example, benefits such as schooling would be expected to be relatively high for non-white headed households. Other benefits allocated on the basis of population, however, such as benefits from unallocable expenditures in general, would go equally to white male-headed households.

Table 11 addresses the hypothesis that benefit levels may also be influenced by variation in local availability of social services. It shows that in fact non-white headed households are much less likely than those headed by whites to live in rural areas. Thus, if level of benefits for low income earners is affected by urban or rural residence, this too is a factor in the high level of benefits generally received by non-white headed households.

TABLE 11

URBAN OR RURAL RESIDENCE, BY RACE AND SEX: PERCENTAGE OF FAMILIES BY RACE-SEX GROUP

	White Male	Non-White Male	White Female	Non-White Female
Total number	48,020	5,520	13,290	2,410
Urban	71.1	79.9	78.6	85.5
Rural	26.6	17.0	19.1	12.0
Other	2.3	3.1	2.3	2.5

In summary, then, it would appear that race and sex are correlated with differences in levels of taxation, and especially, with differences in the level of expenditure benefits. This seems to hold true even when income is held constant. In particular, households headed by non-white females consistently receive a higher level of expenditure benefits, particularly from local expenditures, than any other type of household. Tables 8 and 9 show that in some measure this is due to very high levels of benefits from expenditures such as public assistance, while Tables 10 and 11 indicate that urban residence and a relatively large number of dependents may also help to explain this benefit distribution. Households headed by white females, on the other hand, receive relatively low levels of expenditure benefits, aside from social security benefits, particularly in view of their low mean incomes. In this case, though, the explanation seems to be their small average size, and the fact that their heads are often pensioners. For both types of female-headed households, then, characteristics other than income and household size are important in explaining benefits received.

6. SUMMARY AND CONCLUSIONS

This paper has explored the distribution of expenditure benefits over households in the U.S. We have found that although income level is highly correlated with taxes paid, income alone does not go very far towards explaining the distribution of public expenditure benefits. Instead, these tend to be correlated

with a number of different household characteristics, which vary over the particular public expenditure categories under consideration. Overall, the single variable which appears to be most important in determining the distribution of benefits is household size, although as the analyses by race and sex of household head show, within particular population and income groups other characteristics are also very important.

The analyses by race and sex of head have been included in this paper to demonstrate the importance of variables other than income and household size to any assessment of the redistributive process. Clearly, many other variables could also have been discussed. Nevertheless, we believe that the extent to which these variables were shown to affect redistribution in the U.S. clearly indicates the value of access to microdata in this type of research.

This paper has considered the distribution in the U.S. alone. In the second half of our study, which will appear in a subsequent issue of this *Review*, the findings presented here will be compared and contrasted with the distribution of public expenditures among households in the U.K. and we will discuss the policy effects of the expenditure patterns to be seen in each.

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APPENDIX

Tax and Expenditure Allocation Assumptions for the United States

Item	Allocation Method
State and Local Revenues	
Income Tax	Income tax paid (from IRS)
Sales and Excise Taxes	Consumption
Property Tax—1st Alternative	Capital income
Property Tax—2nd Alternative*	Commercial: capital income; Residential: homeowners and renters
Property Tax—3rd Alternative	Commercial: consumption; Residential: homeowners and renters
Miscellaneous	Population
Federal Revenues	
Income Tax	Income tax paid (from IRS)
Payroll Tax—1st Alternative*	Employees' share: wage income (under $12,000) Employers' share: wage income
Payroll Tax—2nd Alternative	Employees' share: wage income (under $12,000) Employers' share: consumption
Corporate Income Tax—1st Alternative	Capital Income
Corporate Income Tax—2nd Alternative	1/3 consumption, 2/3 capital income
Corporate Income Tax—3rd Alterntive*	1/4 consumption, 1/4 wage income, 1/2 capital income
Gift and Estate Tax	Estate and trust income
Customs and Excise Taxes	Consumption
Miscellaneous	Population
State and Local Expenditures	
Schools	School age children in household
Higher Education	College students in household
Highways	2/3 on automobile ownership; 1/3 on consumption
Public Assistance	Receipt of public assistance
Hospitals	Hospital patients in household
Public Health	Population
Police and Fire—1st Alternative	Total income
Policy and Fire—2nd Alternative*	Population
Unemployment Insurance	Unemployment
Housing	Income level
Unallocable	Population
Federal Expenditures	
Social Security	Receipt of social security payments
Agriculture	Farm insurance
Labor	Wages
Veterans: Health and Disability	Disabled veterans
Veterans: Schooling	Veterans in school
Housing	Income level
Education	College students in household
Public Assistance	Receipt of public assistance
Highways	2/3 on automobile, 1/3 on consumption
Federal Unallocable—1st Alternative*	Population
Federal Unallocable—2nd Alternative	Income
Federal Unallocable—3rd Alternative	Capital income

*This alternative used to produce net benefit figures.