DISTRIBUTION OF WEALTH IN THE UNITED KINGDOM: EFFECT OF INCLUDING PENSION RIGHTS, AND ANALYSIS BY AGE-GROUP*

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This article on the distribution of wealth among individuals in the United Kingdom presents recent work on the effects of including pension rights and the significance of sex, age and marital status. It describes the rationale for including the accrued rights in occupational and State pension schemes (funded or unfunded) and the methods of estimation used. For funded schemes the rights are valued as the accrued liability of the schemes to their members, and for unfunded schemes similar liabilities are hypothecated; these estimates of the value of accrued pension rights involve assumptions about future earnings and interest rates. The trend in average marketable wealth with age is upwards until advanced years when it slows down or slightly reverses. Adding occupational pension rights only slightly raises the trend for females but has a bigger effect for males. Adding State pension rights raises these upward trends until the age of 60 after which there is a decline. For marketable wealth on the average males are wealthier than females but less wealthy if single, divorced or widowed. Adding occupational pension rights improves the relative position of males; adding State pension rights cancels this out. The effect of marital status rises with both age and sex and therefore a detailed three-way analysis is made. For females widows are on average the wealthiest; for young males the married; for older males the single. Using Theil's coefficient of entropy for comparing the inequality of wealth, the addition of pension rights reduces inequality by two-thirds. Age accounts for only 6 percent of inequality for marketable wealth but for 31 percent if pension rights are included.

A. INTRODUCTION

1. *Definitions of Wealth*

Estimates of the extent and distribution of personal wealth are hypothetically possible on a variety of definitions. The choice of definition must depend on:

(a) the use to which the estimates are to be put;
(b) the feasibility of providing a quantifiable valuation of the forms of wealth involved;
(c) the availability of basic data needed to provide the estimates.

From some points of view the most appropriate definition is that of marketable wealth, i.e., the wealth in the hands of the individual. From others, forms of wealth which give the individual benefits or potential income but which are not in his hands—various types of non-marketable wealth—should also be included.

It is not difficult to provide a conceptual framework for marketable wealth and to measure it but many forms of non-marketable wealth such as communal assets and human capital are difficult to quantify. In view of this the Royal Commission on the Distribution of Income and Wealth (RCDIW) opted for marketable wealth and for marketable wealth plus pension rights ([16], pp 41–47)

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as the areas to be covered. These definitions are also used for the official estimates for the U.K. calculated by the Inland Revenue.

Definitions of personal wealth may also differ in the concepts of valuation adopted, e.g., market value or going concern valuation of consumer durables and valuation of pension rights. The definitions used in this article are described later.

Finally estimates of the distribution of wealth may relate to that among individuals or to that among households. This article is concerned with distribution among individuals although there is a short discussion on that among households.

2. *Historical Development of U.K. Official Statistics*

Until 1978 the official estimates of the distribution of personal wealth in the U.K. were based solely on the application of the estate multiplier method to data collected primarily for purposes of tax administration. Such data suffers inevitably from limitations of coverage—it includes only that part of the population and of personal wealth for which probate is needed on death. In addition it has certain other defects from the point of view of providing estimates of the wealth of the living. In particular life insurance policies are valued on death at paid up value, which is much too high for the corresponding wealth of the living.

These and other gaps and imperfections in these estimates were criticised by various academic writers such as Atkinson and Harrison ([3], Chapter 2) and by the RCDIW ([16], paras 186–188) and this led to their replacement by new estimates in which the gaps were filled and corrections were made for the various defects in the old series.

The provision of corrected and comprehensive estimates of the distribution of U.K. personal marketable wealth necessitated supplementary data such as special surveys and above all the provision of estimates of the "balance sheet" of the personal household sector, covering completely the various assets and liabilities of the whole of that sector. Some approximate estimates for 1971 to 1975 of these holdings had been made earlier by the RCDIW ([16], paras 184–185 and Table 27) and, using these, the RCDIW provided estimates of the distribution of total personal marketable wealth. These estimates are now described as Series C. With the introduction in 1978 by the Central Statistical Office (CSO) of estimates of the personal household sector's "balance sheet", and using other supplementary data, the Inland Revenue was able to prepare official estimates of the distribution of household wealth still designated Series C, which took the place of those by the RCDIW. They initially covered the years 1971, 1974, 1975 and 1976 and estimates for more recent years have been provided annually. Further work led to estimates for 1966 although of less accuracy than those for the other years.

The methods used by the CSO to construct balance sheets for the personal sector are described in three articles published in Studies in Official Statistics, No. 35 [5, 6, 15].

The methodology by which Series C has been constructed has been discussed in detail in articles by Dunn and Hoffman [8, 9]. It is not intended to recapitulate

this here but, to indicate the importance of the main stages of adjustment between the estate multiplier estimates and the Series C estimates, Table 1 provides a reconciliation for 1977 on the same lines as those for 1971 and 1975 in the second of these articles [9]. In the later section on wealth by age-group these adjustments have been allocated among age-groups and the methods used are discussed in Appendix I.

Prior to the availability of Series C it was felt that it could be misleading simply to present the estate multiplier estimates (Series A), as these did not cover the very small estates for which probate was not required and which related to about half the adult population. They probably underestimated the inequality of the distribution of wealth and their trend over time might well be biased. Hence an additional Series was introduced (Series B) on the extreme assumption that the missing population had no wealth at all, to provide an estimate of the upper limit in inequality.

It was felt that if Series C figures had been available they would have lain between Series A and B and, as these series had similar downward trends, that in conjunction they provided a reasonable picture of a downward trend in inequality. However it was conceivable, even if unlikely, that for a while the trend in Series C might be upward despite this and this procedure therefore provided no adequate substitute for Series C. In addition there was a tendency for Series B to be quoted in isolation as an indication of the absolute level of inequality rather than as an upper limit. Therefore when Series C became available Series A and B were both dropped.

Table 2 compares for 1966, 1971, 1975 and 1977 the percentage of wealth owned, for Series A, B and C, by the top percentile groups of the population covered, the corresponding Gini coefficients and movements in these figures between years.

The main features of this comparison are as follows:

(a) For the top 1 and 2 percentile groups Series C is sometimes higher than both A and B. This reflects the inclusion of certain types of trust property not covered by the estate multiplier method.

(b) For other percentile groups Series C lies between Series A and B but at varying distances.

(c) For all the years the Series C Gini coefficient lies between those for Series A and Series B. Although the movements in these coefficients generally are in the same direction nevertheless they show some significant differences.

(d) Thus Series C provides a picture similar to that obtained from Series A and B but it is much more accurate because of its wider coverage.

(e) The change in probate threshold in 1975 induced a fall in the Gini coefficient for Series A between 1975 and 1977 and a rise in that for Series B and in this respect provided a misleading comparison between 1975 and 1977; Series C on the other hand shows a genuine lack of movement.

3. *Comparison of Definitions and Coverage of Official and RCDIW Estimates of the Distribution of Wealth in the U.K.*

As a variety of estimates have been published by Inland Revenue and the RCDIW a tabular comparison of their conceptual and actual coverage and of

TABLE 1

RECONCILIATION OF SERIES A, SERIES C AND BALANCE SHEET ESTIMATES FOR 1977

£ BILLIONS

	Wealth of Individuals Identified by Estate Multiplier Methods (Series A)	Timing Adjustments	Adjustments to identified wealth			Additions of excluded wealth			Total Marketable Wealth of Individuals (Series C)	Non-marketable Wealth	Residual	Balance Sheet Total Household Wealth
			Quality of Basic Data	Differences in Coverage	Differences in Method of Valuation	Excluded Joint Property	Excluded Small Estates	Excluded Trusts				
Dwellings	85	14	12	—	2	30	—	1	144	—	4	148
Other buildings, trade assets and land	13	$12\frac{1}{2}$	—	—	3	—	—	2	$30\frac{1}{2}$	—	$8\frac{1}{2}$	39
Consumer durables	9	1	—	—	$36\frac{1}{2}$	$1\frac{1}{2}$	2	—	50	—	—	50
National savings, Cash and liquid assets	18	2	2	—	—	2	3	$\frac{1}{2}$	$27\frac{1}{2}$	—	$12\frac{1}{2}$	40
Building Society shares	21	2	2	—	—	$1\frac{1}{2}$	2	$\frac{1}{2}$	29	—	3	32
Government and Municipal securities	5	$3\frac{1}{2}$	—	—	—	—	—	$1\frac{1}{2}$	10	—	2	12

Listed company shares	17	4	—	—	—	—	—	4	25	—	—	25
Unlisted company shares	5	—	—	—	—	—	—	1	6	—	—	6
Life policies— Other than group	39	—	—	11	$-45\frac{1}{2}$	3	5	$1\frac{1}{2}$	14	—	—	14
Group life assurance and pension schemes	—	—	—	—	—	—	—	—	—	12	—	12
Pension rights	—	—	—	—	—	—	—	—	—	25	—	25
Other assets	20	3	—	—	—	—	—	—	23	—	−10	13
Total assets	232	42	16	11	−4	38	12	12	359	37	20	416
Mortgages	14	—	—	—	—	15	—	—	29	—	3	32
Other liabilities	8	2	—	—	—	1	$\frac{1}{2}$	—	$11\frac{1}{2}$	—	$4\frac{1}{2}$	16
Total liabilities	22	2	—	—	—	16	$\frac{1}{2}$	—	$40\frac{1}{2}$	—	$7\frac{1}{2}$	48
Net Wealth	210	40	16	11	−4	22	$11\frac{1}{2}$	12	$318\frac{1}{2}$	37	$12\frac{1}{2}$	368

TABLE 2

THE DISTRIBUTION OF PERSONAL WEALTH IN THE U.K.: COMPARISON OF SERIES A, B AND C

Series	Most Wealthy Percent of Adult Population	Percentages of Wealth Owned				Changes in Percentages of Wealth Owned			
		1966	1971	1975	1977	1966–71	1971–75	1975–77	1966–67
A[1]	Most wealthy 1%	23	20	17	17	−3	−3	0	−6
(Identified Wealth)	Most wealthy 2%	31	28	24	23	−3	−4	−1	−8
	Most wealthy 5%	44	40	35	35	−4	−5	0	−9
	Most wealthy 10%	56	52	47	47	−4	−5	0	−9
	Most wealthy 25%	75	72	70	68	−3	−2	−2	−7
	Most wealthy 50%	91	90	90	88	−1	0	−2	−3
B[2]	Most wealthy 1%	32	28	23	24	−4	−5	+1	−8
(Identified Wealth)	Most wealthy 2%	41	37	31	33	−4	−6	+2	−8
	Most wealthy 5%	57	52	47	49	−5	−5	+2	−8
	Most wealthy 10%	72	68	62	65	−4	−4	+3	−7
	Most wealthy 25%	92	91	89	92	−1	−2	+3	0
	Most wealthy 50%	100	100	100	100	0	0	0	0
C[3]	Most wealthy 1%	33	31	24	23	−2	−7	−1	−10
(Marketable Wealth)	Most wealthy 2%	42	39	31	30	−3	−8	−1	−12
	Most wealthy 5%	56	52	44	44	−4	−8	0	−12
	Most wealthy 10%	69	65	58	58	−4	−7	0	−11
	Most wealthy 25%	87	86	83	82	−1	−3	−1	−5
	Most wealthy 50%	97	97	93	95	0	−4	+2	−1
		Gini Coefficients				Changes in Gini coefficients			
A		67	64	62	59	−3	−2	−3	−8
B		87	83	80	82	−4	−3	+2	−5
C		81	80	74	74	−1	−6	0	−7

[1]Wealth identified by estate multiplier method and corresponding population.
[2]Wealth as in Series A; total adult population; excluded population assumed to have no wealth.
[3]Total marketable wealth of individuals; total adult population.

the limitations of various series is useful. This is shown in Table 3. Notes are given below on various details in this table. Series D and E, which add, respectively, occupational pension rights and State Pension rights, are discussed below.

B. The Effect of Including Pension Rights on the Distribution of Personal Wealth in the U.K.

The Series C estimates cover only marketable wealth. Consequently they cover net saving out of income when in a marketable form, but exclude contingent rights accruing to individuals in occupational and State pension schemes, which reflect in part individual contributions out of income to those schemes over the years. Rights or entitlements to a pension may be said to constitute a form of wealth in so far as these rights amount to a present or deferred command over resources. For individuals already drawing pensions, their pension rights convey a command over resources continuing until their death (and in the case of a surviving spouse, benefits up to the survivor's death as well); before retirement the pension rights accrued by an individual on his own account at a given date represent a contingent right to a deferred stream of income after retirement, i.e. contingent on survival to retirement whenever that occurs. The terms of occupational pension schemes vary considerably, some including extra facilities such as lump sum payments on death prior to retirement, but in every case valuations may be made in current money terms of members' accrued pension rights. Such valuations will depend on assumptions about the relation between future increases in earnings levels and nominal interest rates, and about certain other variables.

Estimates allowing for occupational pension rights and for both occupational and State pension rights were therefore calculated and published by the RCDIW and called Series D and Series E respectively.

The Government Actuary's Department (GAD) assisted the RCDIW with development of further analyses of the distribution of wealth including pension rights by providing valuations of rights in occupational pension schemes ([17], paragraphs 127–129 and Table 36), and details of the numbers of individuals who were members of such schemes, together with valuations of State pension rights to which almost all United Kingdom citizens are entitled ([17], paragraphs 131 and Table 38). Valuations of both types of rights were made on the basis of average rights accrued for different age and sex groups. Allocation to marital statuses was made on a *pro rata* basis.

The valuation of occupational pension rights, whether funded or unfunded, is of the accrued liability of pension schemes to their members as pensions (including the present value of deferred liabilities).

For funded schemes this valuation does not correspond to the value of their present and deferred assets nor to the value attributed to those schemes in the balance sheet of the household sector, which relates only to the current assets of the scheme. The accrued liability of funded pension schemes to their members often exceeds the present value of their current and deferred assets and, because of this, its estimation is highly sensitive to the assumptions made when discounting future payments of pensions.

TABLE 3

DEFINITIONS, COVERAGE AND LIMITATIONS OF OFFICIAL AND RCDIW SERIES ON THE DISTRIBUTION OF PERSONAL WEALTH AMONG INDIVIDUALS IN THE U.K.

Series	Forms of Wealth Conceptually Covered	Coverage of Adult Population	Coverage of Forms of Wealth Conceptually Covered	Problems of Valuation	Years Covered By: Official Series	Years Covered By: RCDIW Series	Other Problems and Comments
A	Marketable wealth	Individuals with wealth of a type requiring probate on death (1)	Wealth of a type requiring probate on death (1)	a. Life policies valued on death; b. consumer durables valued at second hand market value; c. undervaluation of certain types of assets in small estates	1960–1977	—	a. Timing (3); b. Multipliers (4).
B	Marketable wealth	Total adult population	Only the wealth covered by Series A (as above) (1), (2)	As with Series A	1960–1977	—	As with series A
	Marketable wealth	Total adult population	All personal marketable wealth	Corrections made for the problems of valuation encountered with Series A and B	1966, 1971, 1974 onwards	1972–1975	Corrections are made for imperfections in timing and multipliers and gaps are filled using supplementary data (5)

D	Marketable wealth and occupational pension rights	Total adult population	All personal marketable wealth and occupational pension rights	As with Series C	1971, 1974 onwards	1972–1976	a. As with Series C. b. Based on Series C and supplementary data (6)
E	Marketable wealth occupational and State pension rights	Total adult population	All personal marketable wealth, occupational and State pension rights	As with Series C and D	1971, 1974 onwards	1972–1976	a. As with Series C and D. b. Based on Series D and supplementary data (7)

Notes

1. The wealth excluded from Series A and B consists of:
   a. estates too small to require probate on death;
   b. joint property passing by title on death;
   c. certain types of trust property (accumulation and maintenance settlements, other discretionary trusts, surviving spouse settlements);
   d. certain types of life policy.
2. Series B adopted the extreme assumption that the excluded population has no wealth, to provide estimates of the probable upper limit to inequality.
3. Series A and B estimates were based on year of account data and not on year of death and hence relate to a mix of years. This is corrected in Series C, D and E.
4. The multipliers originally used for Series A allowed for differences in mortality between sexes and among age-groups but not for those among marital statuses. More recent figures and those for Series C, D and E make such allowances.
5. Series C is based on Series A corrected for its gaps and imperfections using supplementary information. The RCDIW estimates used crude balance sheet estimates of the total extent of personal marketable wealth. The official series uses more refined official estimates and other supplementary data.
6. Series D uses supplementary data on occupational pension rights.
7. Series E uses supplementary data on State pension rights.

For unfunded schemes, such as the State pension scheme and certain occupational schemes in the public sector, a value is put on rights in these schemes even though there are no assets to be included in the household sector's "balance-sheet". This is equivalent either to hypothecating current assets and placing a market value on them, or to allowing for an increase in taxable capacity or future growth of profitable public enterprises (or of as yet unvalued private ones) to cover liabilities to members, or to some combination of the two. The estimates depend upon assumptions which imply a claim on future real resources which will have to be supplied by the future working population or by overseas investments, and are therefore particularly sensitive to future economic and demographic changes; this qualification applies to both funded and unfunded schemes but more particularly to the latter.

The aggregate amount of the values put on occupational and State pension schemes is considerable in relation to marketable wealth as can be seen in Table 4 below.

TABLE 4

MARKETABLE WEALTH AND PENSION RIGHTS

£ billions

	1971	1977	1978	1979	1980
Total household marketable wealth (Series C)	150	313	374	460	537
Occupational pension rights	20	60	75	90	110
State pension rights	69	208	238	266	317
Total household wealth (Series E)	239	581	687	816	964
Pension rights as a percentage of total household wealth:					
Occupational pension rights	8	10	11	11	11
State pension rights	29	35	35	33	33
All pension rights	38	46	46	44	44

The value of accrued rights in occupational pension schemes was taken as the discounted value of future payments from pension schemes attributable to each member's service to the date of valuation, allowing for future increases in earnings where they could affect the benefits received in respect of such service. Interest yields and the probabilities of death before or after retirement age were taken into account, as were the chances of members withdrawing from schemes before normal pension age. Having regard to historical differentials between interest yields and earnings inflation as explained by the RCDIW ([18], para 189), it was assumed that over the longer term interest yields would in future, on average, exceed the rate of increase in earnings by one percent. Alternative assumptions would affect the extent of the differences between Series C and D.

In the absence of information on the degree of association between membership in occupational pension schemes and ownership of marketable wealth, RCDIW argued that this must be fairly high, and for a calculation of estimates of the distribution of wealth including occupational pension rights, adopted the

expedient of mapping the number in each age/sex group with such rights on to the wealthiest section in the group, and assuming equal pension rights by rights-holders within the wealthier element. The latter assumption of equality of rights among rights-holders in a given age/sex group would have tended to lead to overstatement of the equalizing effects of including pensions in the definition of wealth in RCDIW's estimates, since such rights are linked with earnings which are themselves unequally distributed.

In the later official estimates of the distribution of wealth, a different approach has been adopted to cope with the problem of lack of information both on the attribution of pension rights at different levels of wealth holding and on the variability of values of those rights; sensitivity tests showed that the results are not likely to be seriously biased by one's choice of "reasonable" assumptions, and for calculations of the share of total wealth owned by the wealthiest ten percent bias would be insignificant. Table 5 shows estimates reproduced from Inland Revenue Statistics. These employ two assumptions as to the degree of association between occupational pension rights and marketable wealth to show the extremes of the likely range of actual share of wealth including pension rights. With the first assumption those holding some rights are assumed to be evenly distributed within a given age group irrespective of holdings of marketable wealth, and to hold accrued pension rights equal to the average for scheme members in that age group. The second assumption follows the RCDIW's method in allowing for the correlation between *possession* of pension rights and marketable wealth, but extends the RCDIW approach by further incorporating an allowance for the possibility of a high association between the *value* of pension rights and marketable wealth by separating beneficiaries into three sub-groups based on size of marketable wealth holding; to these are allocated higher than average, average, and lower than average values of occupational pension rights respectively.

Average State pension rights accrued for each age/sex group have been allocated evenly to adults in each group. No allowance has been made for the currently very small differentials which are attributable to the accrual of rights to earnings-related supplements in the State schemes.

For all but a very small minority of owners of large holdings of wealth, rights in pension schemes, whether occupational pension schemes or the State pension scheme, have become over the last decade or two an increasingly important component of personal wealth over and above holdings of marketable wealth. Over the period covered by the tables above, the value of rights in the State pension scheme increased in real terms, as in most European countries [10], while the rights of most members of occupational pension schemes have been protected to some degree against inflation. When pension rights are included in the definition of wealth the share of total wealth of the richest groups is shown to be markedly less than their share in percentage terms of marketable wealth alone. The definition of wealth including occupational and State pension rights is intended to conform conceptually to wealth "accruing" to given individuals at a given date including direct savings and indirect savings for retirement. The State pension rights represented are rights obtained by contributions to the basic

TABLE 5

THE DISTRIBUTION OF PERSONAL WEALTH IN THE U.K.: COMPARISON OF SERIES C, D AND E

Series	Most Wealthy Per Cent of Adult Population	Percentages of Wealth Owned								
		1966	1971	1974	1975	1976	1977	1978	1979	1980
C	Most wealthy 1%	33	31	23	24	24	23	23	24	23
(Marketable wealth)	Most wealthy 2%	42	39	30	31	32	30	30	32	30
	Most wealthy 5%	56	52	43	44	46	44	44	45	43
	Most wealthy 10%	69	65	58	61	58	58	59	58	58
	Most wealthy 25%	87	86	84	83	84	82	83	82	81
	Most wealthy 50%	97	97	93	95	95	95	95	95	94
D	Most wealthy 1%	Not	27	19	20	21	19	19	20	19
(Marketable wealth and	Most wealthy 2%	available	34	26	26	27	25	26	26	25
occupational pension rights)	Most wealthy 5%		46	38	38	40	38	39	38	37
	Most wealthy 10%		59	52	52	53	51	52	51	50
	Most wealthy 25%		78–83	76–82	75–81	75–81	74–78	75–79	75–79	73–77
	Most wealthy 50%		90–96	88–92	88–92	89–93	88–92	85–93	89–93	89–93
E	Most wealthy 1%	Not	21	15	13	14	12	13	13	12
(Marketable wealth,	Most wealthy 2%	available	27	21	18	18	17	17	19	16
occupational and State	Most wealthy 5%		37	31	27	27	25	25	27	25
pension rights)	Most wealthy 10%		49	43	37	37	35	36	37	35
	Most wealthy 25%		69–72	64–67	58–61	58–61	55–58	57–60	58–61	57–60
	Most wealthy 50%		85–89	85–89	81–85	80–85	78–82	79–83	79–83	79–83

State pension including earnings related supplement. It should be noted that contingent "rights" to other State disbursements such as supplementary benefits (roughly half of all pensioners receive such supplements meeting needs not covered by the basic State pension or other sources of income), sickness and unemployment benefits are not included in these definitions of wealth. If these and other items of a non-marketable nature that contribute to economic well-being, such as rights to subsidized accommodation, free education and health care and other benefits provided by the public sector, were to be included the share of wealth of the wealthier groups would appear to be less than that in the Series E figures.

C. The Distribution of Personal Wealth in the U.K. by Age-Group, Sex and Marital Status

1. *Previous Work*

Studies have been made from time to time on the extent to which the inequality of distribution of personal wealth is due to various factors such as life-time savings out of employment or investment income, inheritances or gifts *inter vivos*, trust property etc ([3], Chapter 8, [11]). In assessing these factors it is useful to have a picture of differences in the distribution of wealth among and within age-groups. As will be shown later their interpretation is inadequate without taking into account also sex and marital status, comparisons among which are also of interest in their own right.

It must be emphasized that the figures analyzed by age-group do not in themselves provide a description of an average life-cycle. They are a "snapshot" of various generations at one point of time whose experiences may differ significantly. For example, consider two age-groups today, one twenty years older than the other. Twenty years ago the earnings at constant prices of the older group may have been less than those of the younger group today. It might well have been less able to save or to protect its saving against inflation. Hence the average wealth of this older age group might be little higher today than that of the younger. In this case a crude inspection of the data might suggest that life-time savings are unimportant whereas the true picture would be that they had become increasingly important.

Another factor that can be easily overlooked is that inheritances are received at different ages by different individuals and the pattern of their reception must affect both comparisons between and within age-groups. For example, if all wealth were inherited and every individual received the same eventual inheritance but at varying ages we would find that:

(a) average wealth increased with age;
(b) there was inequality of distribution of wealth within age-groups—but to a decreasing extent as age increased.

Estimates of the distribution of wealth by age-group have been previously made for the U.K. (or Great Britain for earlier years) either from the estate

multiplier statistics on a Series A or B basis or from sample surveys. The following types of information have been published:

(a) average wealth-holding in the various age-groups;
(b) percentages of wealth held by various percentile groups within these age-groups;
(c) proportions of wealth owned by given age-groups as a percentage of proportions of the population in that age-group;
(d) Gini coefficients within age-groups.

Estimates have been published for selected years between 1923 and 1975 on various bases and with various combinations of types of information. Some were subdivided by sex. Various figures for these years were given in articles by academics ([1], [2], [3], [12], [13], [19]) and in RCDIW Reports ([16], Tables 50–51, [17], Tables 27–28, [18], Table 32). Details of what is available are shown in Appendix II.

Apart from the estimates for 1953, which were based on a sample survey in a particularly difficult field, the estimates previously published were subject to the various gaps and imperfections resulting from using estate duty data—in particular the valuation of life insurance policies as at death and the omission of a substantial part of the adult population and of various forms of wealth. It was therefore decided that an analysis of the Series C distribution of total marketable wealth by age-group should be made; Dunn and Hoffman ([19], page 104) mentioned plans to produce in 1979 such an analysis for the year 1975. However it was decided to give priority to developing the official estimates of the overall distribution of wealth including pension rights, and the work on age-groups was thereby delayed. This work has now been carried out and extended to cover sex and marital status (for reasons described below) and to provide analyses on Series D and Series E bases as well as for Series C.

2. *New Work on Marketable Wealth*

The year 1977 was chosen instead of 1975 for two reasons: partly because it was the most recent year for which the required figures were available but also because the calculations could be carried out more accurately than with 1975 data.

As different workers may prefer to analyze information in different ways primary as well as derived statistics are presented in the present article. As it is usually considered that the Gini coefficient is not amenable to decomposition into additive within-group and between-group components, Theil's coefficient of entropy, which can be thus decomposed, has been used instead.

Under certain circumstances comparisons between age-groups can be affected/biased by differences between sexes and vice-versa. This can be easily understood by considering the following situation—

(a) wealth increases consistently with age;
(b) male wealth is higher than female within each age-group;
(c) the proportion of females increases with age;

– in this case the overall difference between males and females will be diluted or even eradicated.

Within Series C data, wealth increases consistently with age overall and for females but not for males, and hence there is no such dilution effect. Secondly, male wealth is consistently higher than female wealth for the married but not for the other marital statuses. Nevertheless it was felt that an analysis by age-group would be inadequate without an examination of sex differences and that these are of interest, in any case, in their own right. Furthermore interpretation may be inadequate unless marital status is also taken into account. The present article therefore introduces Series C (and later Series D and E) estimates of the average wealth of various age-groups cross-classified by sex and marital status.

Resources have not been available to provide figures within specific age-groups similar to those in Table 2, giving the percentage of total wealth held by given percentile groups of the population.

The first section of Table 6 shows the average marketable wealth (Series C) for various sex × marital status × age categories and Charts I to V illustrate these figures. Charts I and II compare the male and female age-patterns overall and for the married respectively. Charts III to V compare marital status overall and for males and females separately. In these charts, as in the tables, the singles include the divorced and the term "widowed" includes males as well as females.

The main features of these figures are as follows

(a) Taking together marital statuses and sexes, there is an initial sharp upward trend in average marketable wealth with age followed by a gentle upward trend with advancing years (Chart I).

(b) For males a peak is reached somewhat earlier after which average wealth falls off slightly whilst for females the upward trend continues throughout (Chart I).

(c) For the married, who constitute two-thirds of the adult population, the patterns are fairly similar to those for all statuses, but, except for the advanced years, the excess of male wealth over female is greater (Chart II).

(d) Fairly similar patterns are found with all these marital statuses when both sexes are taken together (Chart III).

(e) For single males the upward trend continues until later in life, but for the married males there is a fall after 45. The figures for widowers are subject to considerable error variation because of the very small numbers involved in lower age-groups (Chart IV).

(f) For females the married show an upward trend until advanced years; the single and widows show a steep upward trend followed by a slight decline (Chart V).

We need to consider whether the overall comparison of male and female wealth is biased by any interaction between differences in average wealth at different ages and varying proportions of males and females at different ages. To test whether such interactions occur with our data a comparison is made of two types of average, at the foot of the first section of Table 7 below, which compares male with female wealth. The first row labelled "straight comparisons" simply gives the differences between male and female wealth. The second gives weighted averages of the differences between male and female wealth for the various age-groups in which these differences are weighted by the totals of males

TABLE 6

THE ANALYSIS OF AVERAGE PERSONAL WEALTH IN THE U.K. IN 1977 BY AGE-GROUP, SEX AND MARITAL STATUS (SERIES C, D AND E)

£ Thousands per head

		Males				Females				All Adults			
Series	Age Group	Single and Divorced	Married	Widowed	All Statuses	Single and Divorced	Married	Widowed	All Statuses	Single and Divorced	Married	Widowed	All Statuses
C	18–	1.7	3.2	—	2.0	1.6	2.0	—	1.8	1.7	2.4	—	1.9
	25–	4.8	7.1	—	6.6	4.7	3.0	3.0	3.3	4.8	5.0	3.0	4.9
	35–	6.9	9.7	7.2	9.3	6.8	5.0	9.9	5.2	6.9	7.3	9.5	7.3
	45–	8.8	9.4	5.7	9.3	11.9	4.9	12.1	6.1	10.3	7.2	10.8	7.7
	55–	10.8	7.3	7.2	7.7	10.2	6.6	9.0	7.5	10.5	7.0	8.7	7.6
	65–	9.8	6.6	8.7	7.2	8.3	7.9	8.8	8.3	8.8	7.2	8.8	7.8
	75+	10.2	8.4	8.1	8.4	10.3	7.3	9.6	9.3	10.3	7.9	9.3	9.0
	All age-groups	4.6	7.9	8.0	7.1	5.7	4.9	9.3	5.7	5.1	6.4	9.1	6.4
D	18–	1.8	3.3	—	2.1	1.7	2.0	—	1.8	1.8	2.5	—	2.0
	25–	5.4	7.6	—	7.1	4.9	3.2	3.1	3.4	5.2	5.3	3.1	5.3
	35–	8.3	12.1	9.7	11.7	7.1	5.3	10.2	5.5	7.8	8.2	10.1	8.1
	45–	11.9	12.5	8.8	12.4	12.7	5.7	12.9	6.9	12.3	9.1	12.1	9.6
	55–	15.8	12.3	12.1	12.7	11.9	8.3	10.8	9.2	12.9	10.4	11.0	10.8
	65–	13.7	10.5	12.6	11.1	9.8	9.4	10.3	9.8	11.1	10.1	10.7	10.4
	75+	12.2	10.4	10.1	10.4	10.9	7.9	10.2	9.9	11.2	9.6	10.2	10.1
	All age-groups	5.7	10.5	11.3	9.4	6.3	5.6	10.3	6.4	6.0	8.0	10.5	7.9
E	18–	2.3	3.9	—	2.7	2.7	3.0	—	2.8	2.5	3.3	—	2.8
	25–	7.0	9.3	—	8.7	7.8	6.1	6.1	6.4	7.3	7.6	6.1	7.6
	35–	12.5	15.3	12.8	14.9	12.6	10.8	15.7	11.1	12.6	12.5	15.1	12.5
	45–	18.8	17.4	13.7	17.3	21.0	14.0	21.2	15.2	18.8	15.7	19.7	16.2
	55–	23.5	20.0	19.8	20.4	22.8	19.2	21.6	20.0	23.1	19.6	21.3	20.2
	65–	21.7	18.5	20.6	19.1	18.5	18.1	19.0	18.5	19.6	18.3	19.3	18.8
	75+	16.6	14.7	14.4	14.8	15.6	12.6	14.9	14.6	15.8	13.9	14.8	14.7
	All age-groups	8.1	14.9	16.3	13.3	10.6	11.9	17.6	12.6	9.4	13.4	17.3	13.0

CHART I

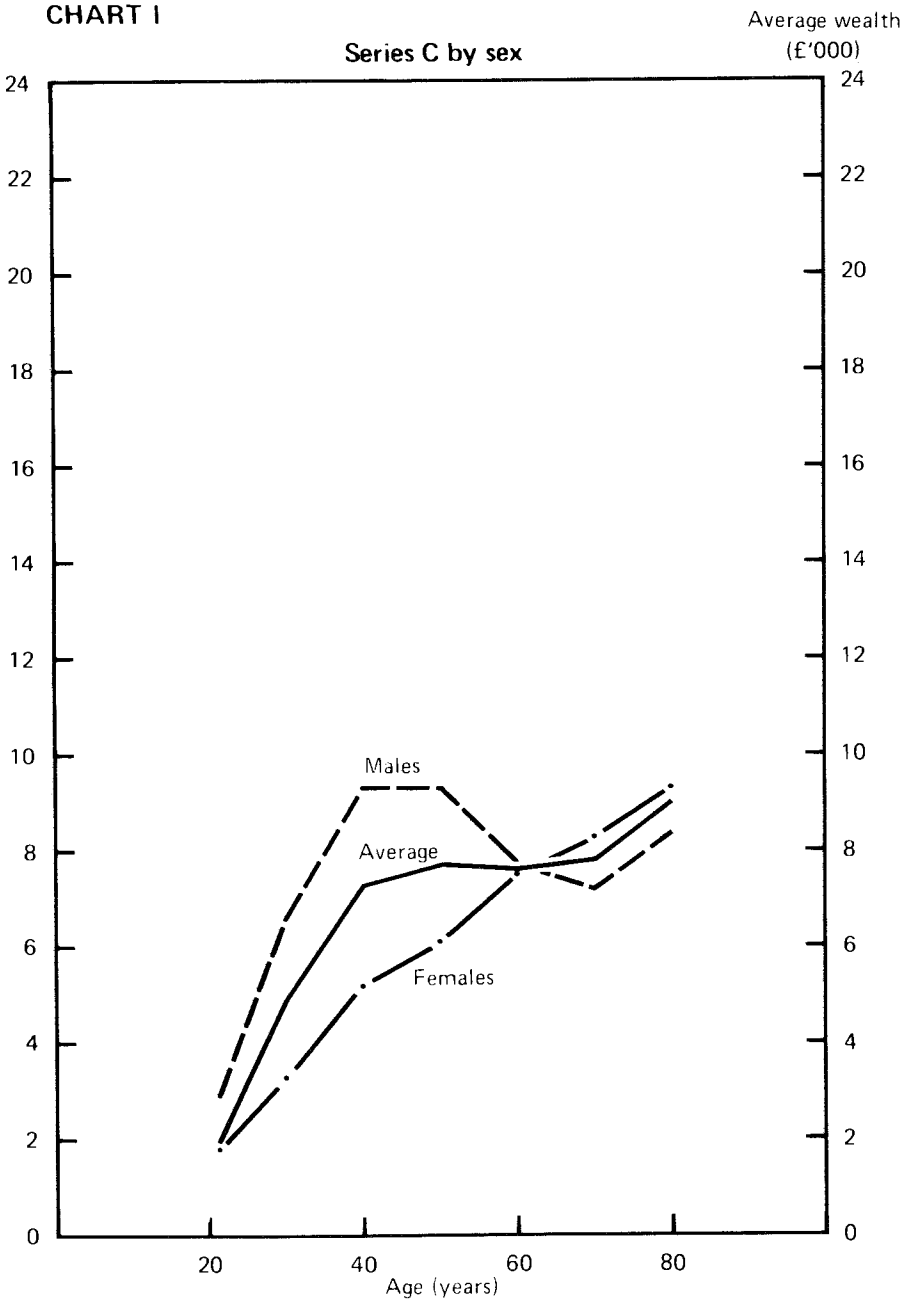

Series C by sex
Average wealth
(£'000)
24
22
20
18
16
14
12
10
8
6
4
2
0
Males
Average
Females
20
40
60
80
Age (years)

CHART II

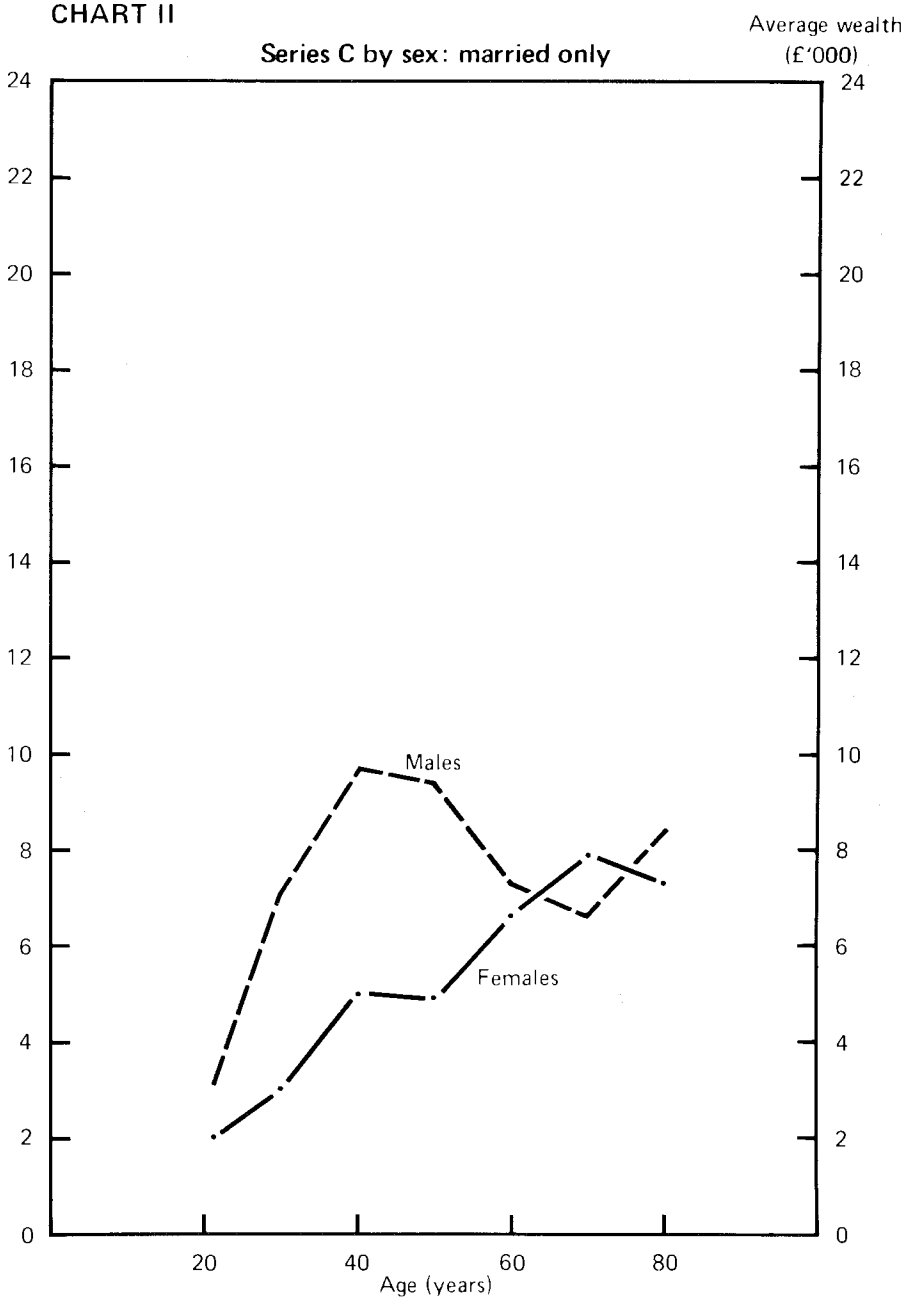

Series C by sex: married only
Average wealth (£'000)
24
22
20
18
16
14
12
10
8
6
4
2
0
Males
Females
20
40
60
80
Age (years)

CHART III

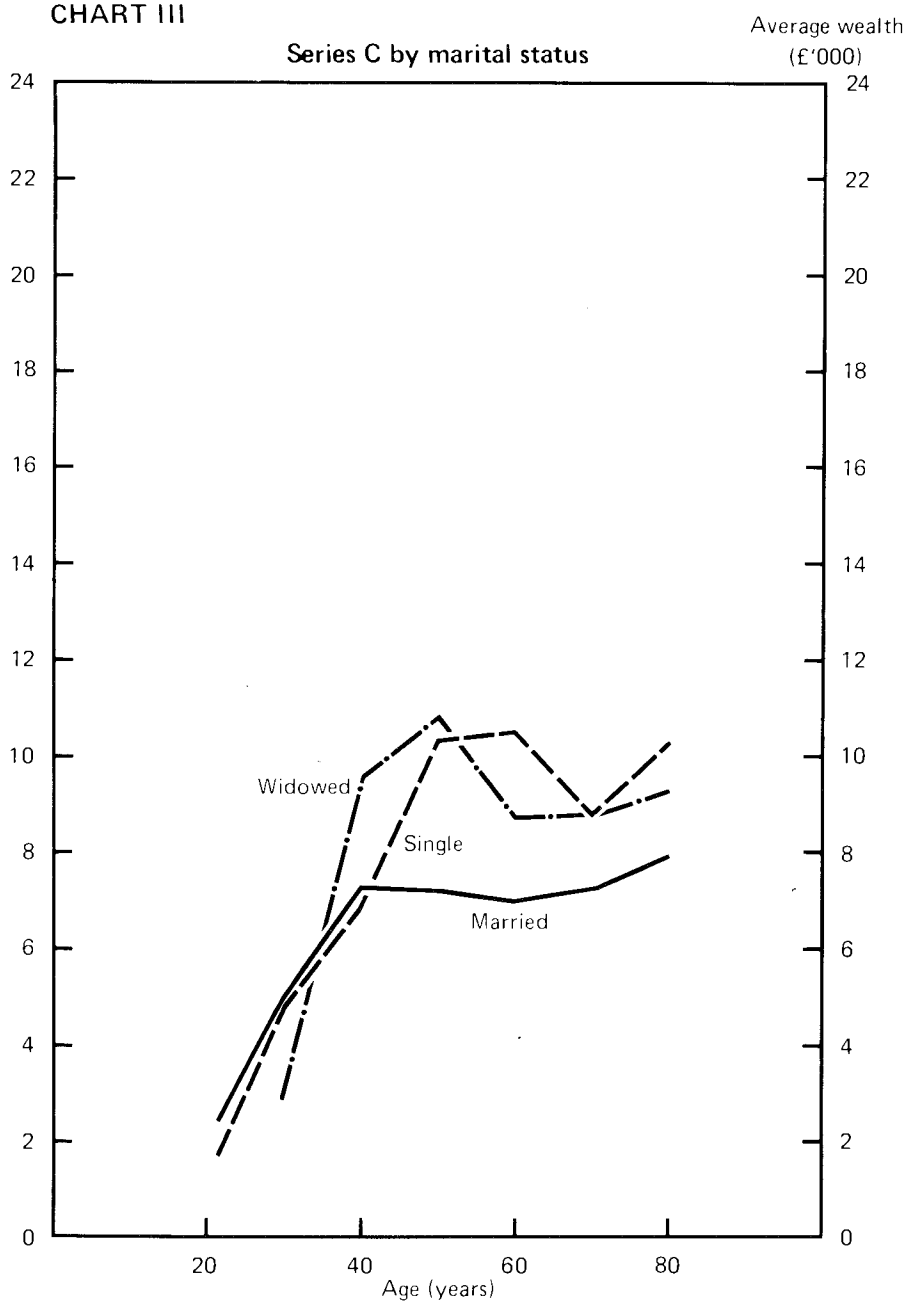

Series C by marital status
Average wealth
(£'000)
24
22
20
18
16
14
12
10
8
6
4
2
0
Widowed
Single
Married
20
40
60
80
Age (years)

CHART IV

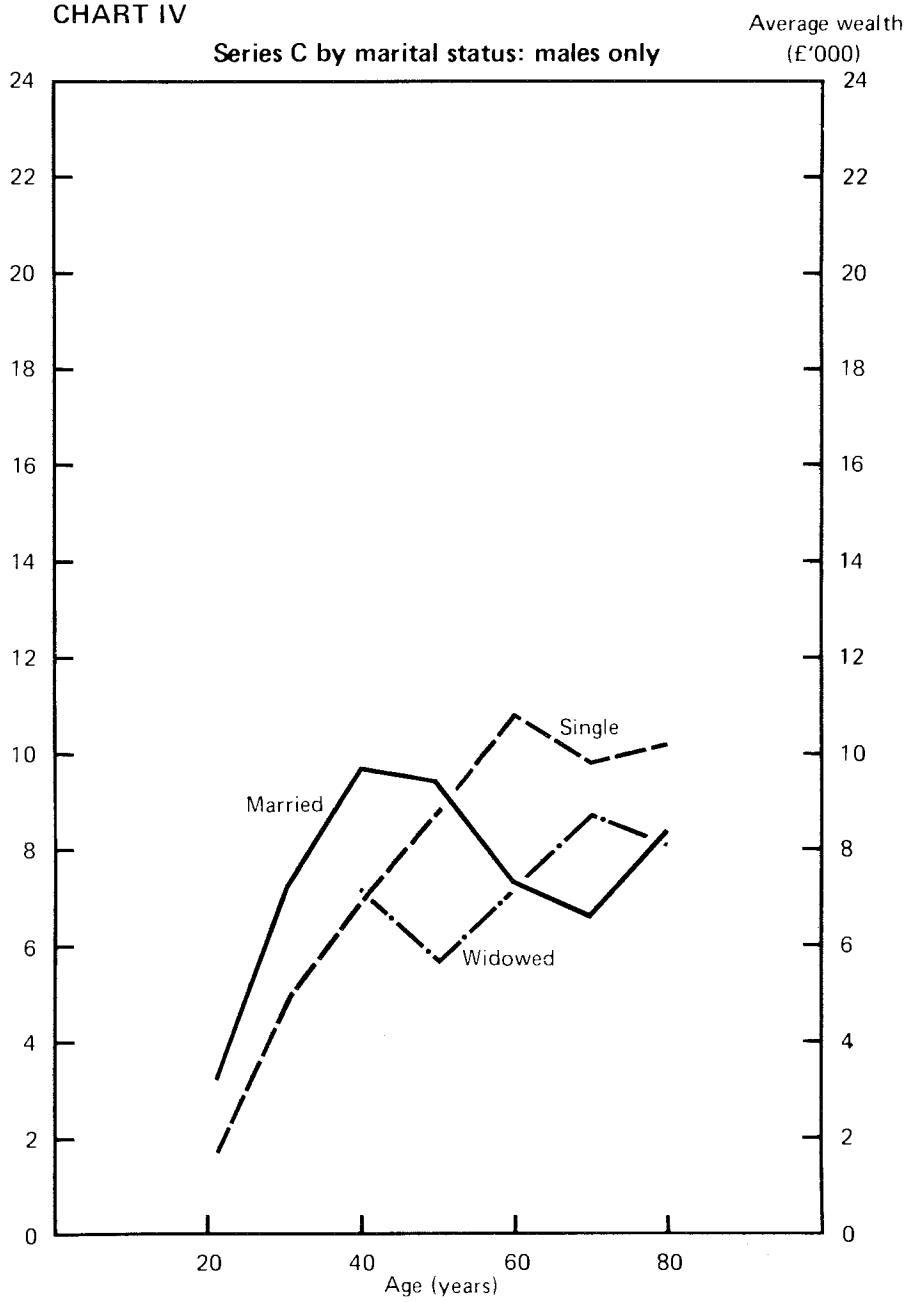

Series C by marital status: males only
Average wealth (£'000)
24
22
20
18
16
14
12
10
8
6
4
2
0
Single
Married
Widowed
20
40
60
80
Age (years)

CHART V

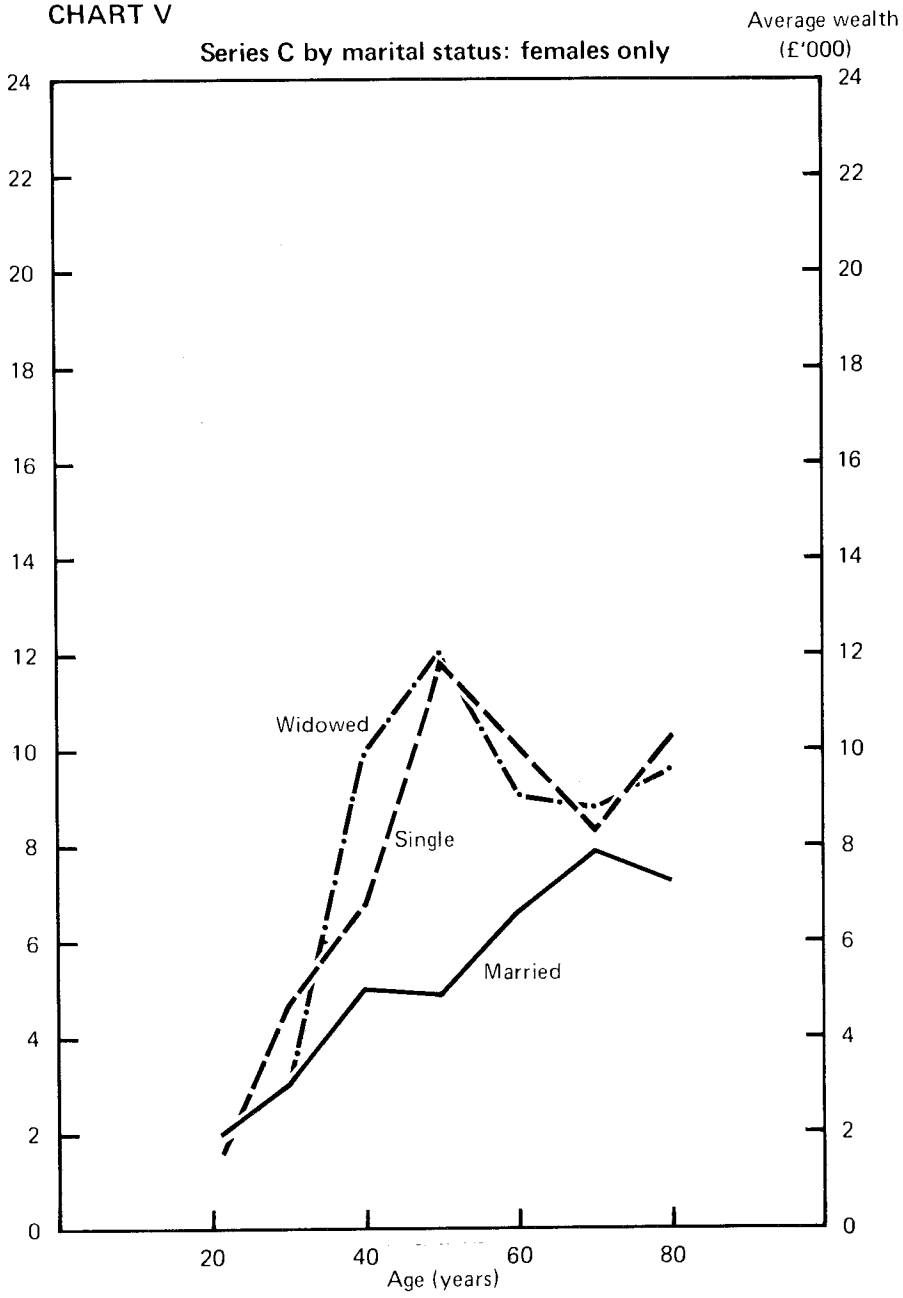

Series C by marital status: females only
Average wealth (£'000)
24
22
20
18
16
14
12
10
8
6
4
2
0
Widowed
Single
Married
20
40
60
80
Age (years)

TABLE 7

DIFFERENCES IN AVERAGE TOTAL WEALTH IN THE U.K. IN 1977 BETWEEN MALES AND FEMALES BY AGE AND MARITAL STATUS (SERIES C, D, AND E)

MALE AVERAGE WEALTH LESS FEMALE

Series	Age-group	£ thousands Single and divorced	Married	Widowed	All Statuses
C	18–	0.1	1.2		0.2
	25–	0.1	4.1		3.3
	35–	0.1	4.7	−2.7	4.1
	45–	−3.1	4.5	−6.4	3.2
	55–	0.6	0.7	−1.8	0.2
	65–	1.5	−1.3	−0.1	−1.1
	75+	−0.1	1.0	−1.5	−0.9
All ages:					
Straight comparisons		−1.3	3.0	−1.3	1.4
Special weighted averages		0.1	2.8	−1.4	1.6
D	18–	0.1	1.3		0.3
	25–	0.5	4.4		3.7
	35–	1.2	6.8	−0.5	6.2
	45–	−0.8	6.8	−4.1	5.5
	55–	3.9	4.0	1.3	3.5
	65–	3.9	1.1	1.3	1.3
	75+	1.3	2.5	−0.1	0.5
All ages:					
Straight comparisons		−0.6	4.9	0.0	3.3
Special weighted averages		0.8	4.5	1.0	3.2
E	18–	−0.4	0.9		−0.1
	25–	−0.8	3.2		2.3
	35–	−0.1	4.5	−2.9	3.8
	45–	−4.2	3.4	−7.4	2.2
	55–	0.7	0.8	−1.8	0.4
	65–	3.2	0.4	1.6	0.6
	75+	1.0	1.1	−0.5	0.3
All ages:					
Straight comparisons		−2.5	3.0	−1.3	0.7
Special weighted averages		−0.5	2.4	−0.5	1.3

plus females for each age-group. These averages are labelled "special weighted averages".

In this table the straight comparisons of Series C averaging wealth over all age-groups give a very similar picture to those derived from the special weighted averages although those for the single and divorced differ a little. Similarly it can be shown that differences between age-groups are little affected by those between sexes.

With marital status the chance of such interactions is greater as there is significant variation in the proportions of the single and widowed for some age-groups. Nevertheless it can be shown with our data that interactions between marital statuses and sex and age-groups are not important.

The figures for the widowed are subject to considerable error variability because of the relatively small numbers in the sample of the deceased on which the estimates of identified wealth are based (especially in the case of widowers). The figure of minus £3,100 for singles and divorced aged 45–54 looks anomalous

but in fact a similar pattern is found for other years and reflects differing age-patterns for males and females.

For Series C the sex × age-group pattern is similar to what would be provided by an examination of Series A or Series B.

It must be emphasized that, in addition to these figures giving a picture at a moment of time rather than one of an average life-cycle, the series for the separate marital statuses cannot be regarded as independent. All of the married have been single at some time and all of the widows/widowers have previously been married. In addition, in the probate returns of the deceased that are grossed up to provide estimates of the living, individuals who die single are *ipso facto* members of the sub-population of single persons who never marry and similarly those dying married come from a sub-population which never becomes widowed.

3. *New Work on Wealth including Pension Rights*

The second and third sections of Table 6 compare overall wealth among all sexes and marital statuses after the addition of occupational pension rights (Series D) and occupational pension and State pension rights (Series E). These figures are illustrated in Charts VI to VIII, which relate respectively to overall differences between the three series; differences for males and females separately; and differences for marital statuses separately (Series D has been omitted from this chart to prevent congestion).

The main features are as follows:

(a) The addition of occupational pension rights, which account for about 10 percent of U.K. household wealth on a Series E basis, slightly increases differences among age-groups, suggesting a "hump profile".

(b) The addition of State pension rights, which account for about a third of household wealth, accentuates this pattern very much more.

(c) The addition of occupational pension rights widens the gap between average male and average female wealth but the further addition of State pension rights lowers it again.

(d) The addition of occupational pension rights only raises the upward trend with age for females a shade but has a more significant effect on male wealth.

(e) The addition of State pension rights considerably raises the upward trend in both male and female average wealth until an average age of about 60, after which it falls so that by an average age of about 80 it is down to the average at about 40.

(f) Similar patterns are found for the three marital statuses within Series D and within Series E.

The second and third sections of Table 7 investigate for Series D and E whether sex differences are biased by age differences. It will be seen that interactions are moderate with Series D but with Series E there are larger interactions between age and sex differences for the single and widowed. Interactions between age and marital status are not important except that for the single overall average wealth is significantly reduced by the high proportion of younger age-groups for which average wealth is lower.

When occupational pension rights are added on the overall degree of inequality decreases but the extent of inequality associated with age-groups

CHART VI

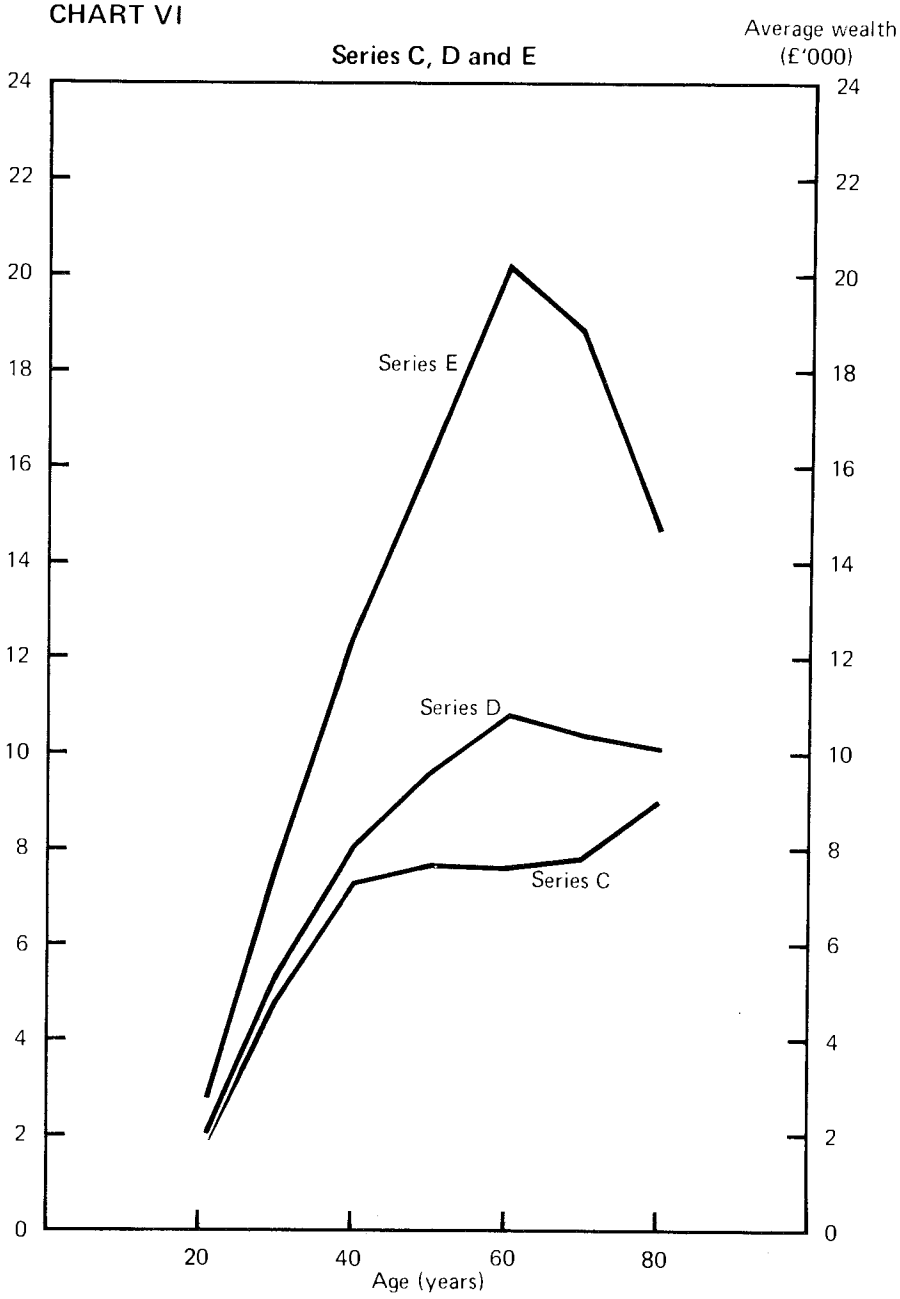

Series C, D and E
Average wealth
(£'000)
24
22
20
18
16
14
12
10
8
6
4
2
0
Series E
Series D
Series C
20
40
60
80
Age (years)

CHART VII

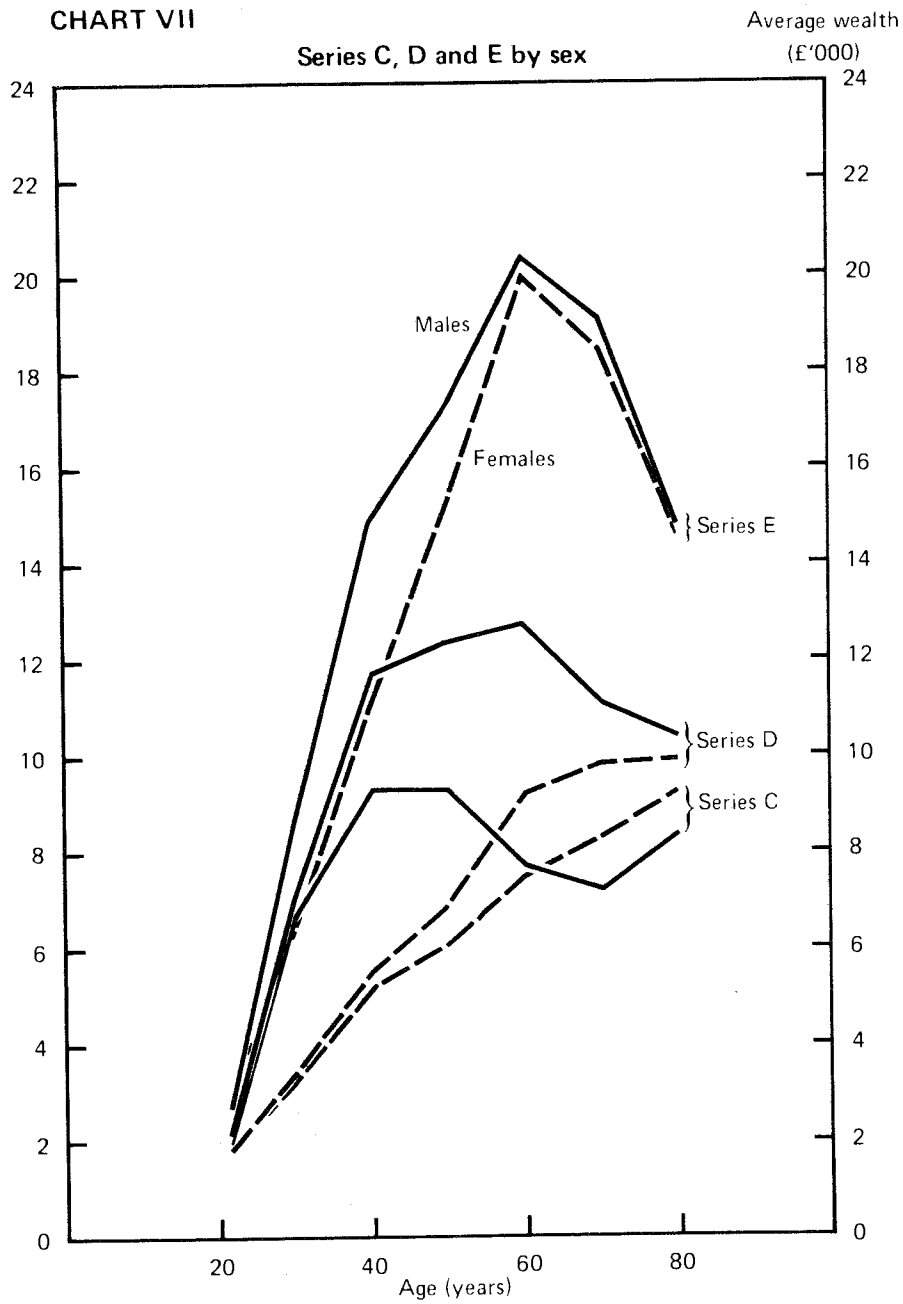
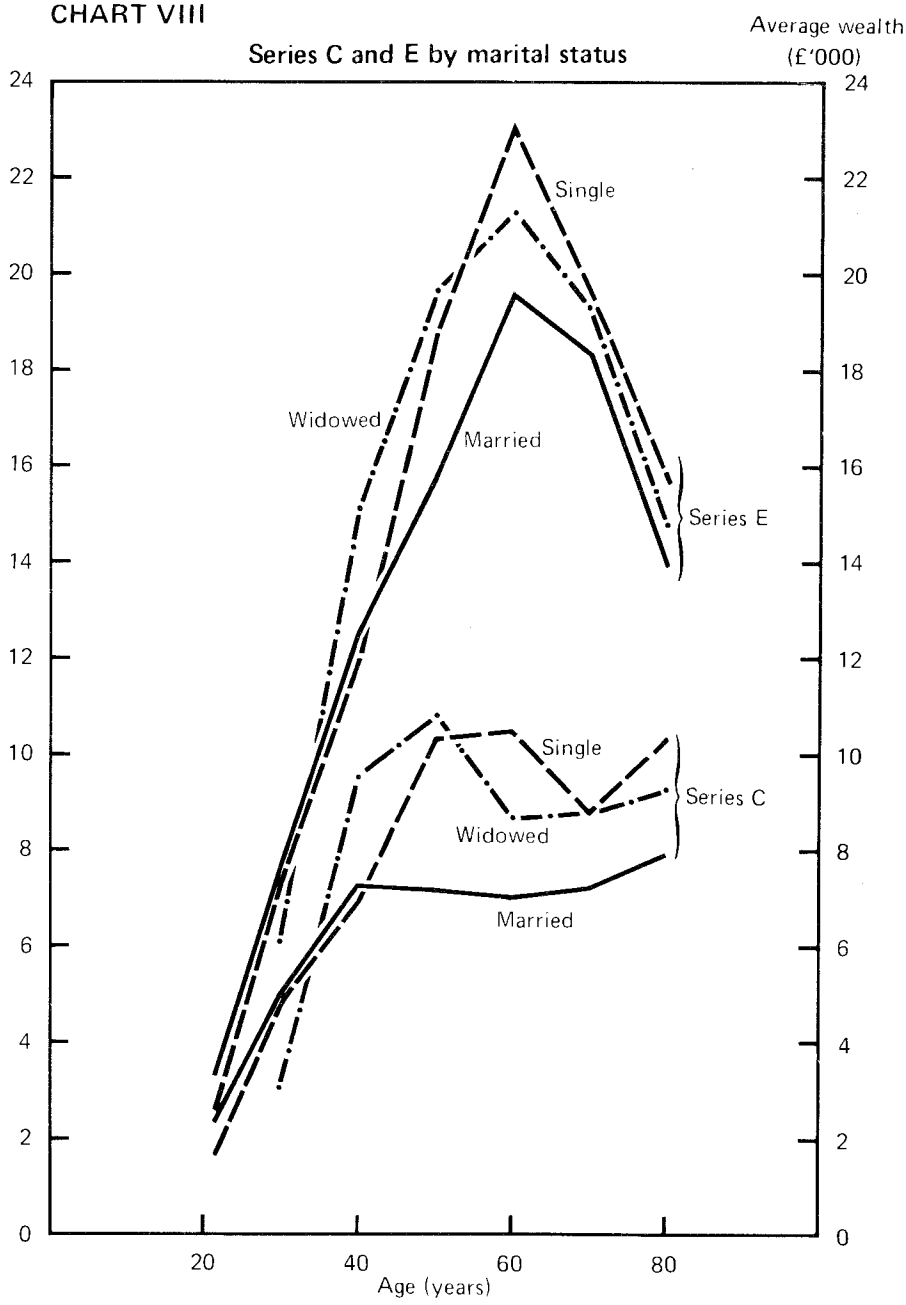

Series C, D and E by sex
Average wealth
(£'000)
24
22
20
18
16
14
12
10
8
6
4
2
0
Males
Females
Series E
Series D
Series C
20
40
60
80
Age (years)

CHART VIII


Series C and E by marital status
Average wealth (£'000)
24
22
20
18
16
14
12
10
8
6
4
2
0
Single
Widowed
Married
Series E
Single
Widowed
Married
Series C
20
40
60
80
Age (years)

increases. The addition of State pension rights has similar but more marked effects. These changes and the implications for variation within age-groups are examined in Table 10.

4. *The Decomposition of Inequality of Distribution of Wealth into Components*

The inequality of the distribution of wealth within a given age, sex or marital status group can be assessed by measures such as the Gini coefficient, but it is interesting to examine the question whether inequality can be decomposed into components—so that we might say that P_1 percent relates to differences between sexes, P_2 to those between age groups, P_3 to marital status and P_4 to variation within this cross-classification of groups—and, if so, to consider the interpretation of such components. But there are several types of difficulty about this—conceptual, statistical and interpretational:

(i) Various measures of inequality have been devised and their fulfilment of various desiderata considered in the literature, e.g., by Cowell [7]. However none of these measures can be classed uniquely as the "best" measure and no such unique measure can exist if we are to allow for various political and social views on what is desirable or undesirable.

(ii) Shorrocks [20] has demonstrated that most measures of inequality cannot be decomposed into additive components. This is a disadvantage, but does not imply in itself that a measure is wrong—many other coefficients in economic, sociological and scientific fields are not additive, and it would be a mistake to reject a coefficient simply because it lacks this property.

For the U.K. official statistics of the distribution of wealth we normally use the Gini coefficient, which in one sense can be considered neutral: it weights equally all comparisons of every individual with every other individual. But unfortunately it is not amenable to decomposition into additive "between" and "within" components under normal circumstances.

There are also problems with interpretation:

(a) As already discussed the different marital statuses do not really constitute separate groups, as most individuals shift between these statuses during their life-cycles.

(b) Overall differences between average wealth of various groups relating to one factor can be affected by those relating to others when the proportions of numbers interact across groups, e.g., the effects of age differences, sex and marital status differences interact. Hence even with additive coefficients we might need to allow for non-orthogonality.

(c) There is no unique partitioning of a cross-classification. For example we might conceive of marital status as a factor in itself or alternatively look separately at differences between single and married men and those between single and married women. Unless there are prior reasons for making a particular choice we should allow for a flexible interpretation of the data if possible but this may be difficult in practice.

(d) Apart from these difficulties it must be emphasized again that decomposition of inequality between and within age-groups does not in itself constitute an analysis into factors such as life-time savings and inheritance although it may throw light on these.

(e) Finally it must be noted that as the analysis relates to age-groups and not to ages it will slightly underestimate the importance of variation between ages and overestimate that within ages.

Despite these difficulties it was felt that it would be useful to attempt a decomposition of inequality and for this purpose we considered three measures:

(a) *Variance.* This is usually described as decomposable although it is not itself decomposable—it is the sums of squares from which variances are derived which are additive. It is not independent of scale and is therefore unsuitable for making comparisons over time. Although this might not seem to matter when examining data at a particular point of time nevertheless it could affect within group comparisons when average wealth differs between these groups. Therefore the variance was rejected.

(b) We considered a decomposable measure mentioned by Theil [22] and discussed by Shorrocks [20] which is:

$$\frac{1}{N}\sum_i \log \mu/x_i.$$

This has many good qualities, but as

$$x \to 0 \qquad \log 1/x \to \infty.$$

Hence this measure would be excessively sensitive to very low values and could have disadvantages with our data.

(c) *Theil's coefficient entropy* This is mathematically defined as

$$T = \frac{1}{N}\sum_i \frac{x_i}{\mu} \log \frac{(x_i)}{(\mu)}$$

where

x_i = wealth of the ith individual

N = total number

μ = average wealth.

Theil's coefficient divides each individual's wealth by the mean wealth (which incidentally removes the scale of measurement), multiplies by the logarithms of these ratios and sums these products. This compares the wealth of every individual with that of every other one and averages such differences as the mean difference. This is divided by the mean to eliminate the scale of measurement and usually standardized to run from 0 to 100 percent.

This coefficient has been tested against various criteria and has been shown to have several advantages. In particular it has the property that it can be clearly decomposed into additive components (as shown by the formula below), which is essential for the analysis in this section. Moreover, as when $x \to 0$, $x \log x \to 0$ it is more suitable than the coefficient mentioned under b for our data.

Its decomposition is as follows:

$$T = \frac{1}{N} \sum_i \sum_j n_{ij} \frac{(x_{ij})}{(\mu)} \log \frac{(x_{ij})}{(\mu)}$$

$$T_{w_i} = \frac{1}{N_i} \sum_j n_{ij} \frac{(x_{ij})}{(\mu_i)} \log \frac{(x_{ij})}{(\mu_i)}$$

$$T_w = \frac{1}{N\mu_i} \sum_i N_i \mu_i T_{w_i}$$

$$T_b = \frac{1}{N} \sum_i N_i \frac{(\mu_i)}{(\mu)} \log \frac{(\mu_i)}{(\mu)}$$

$$T = T_w + T_b$$

where

T = overall Theil's coefficient
T_{w_i} = within group i Theil's coefficient
T_w = within group Theil's coefficient
T_b = between groups Theil's coefficient
X_{ij} = wealth at point x_{ij} within group
μ_i = average wealth of group
μ = overall average wealth
n_{ij} = number with wealth x_{ij}
N_i = number in group i
N = overall number.

A comparison is made in Table 8 between the movements in Theil's coefficient and those in the Gini coefficient (expressed as a proportion) for the distribution of wealth in the U.K. between 1971 and 1977.

Both coefficients show a downward movement in inequality whether for marketable household wealth or total household wealth including pension rights. However the downward trend in Theil's coefficient for Series E is much more marked than that for the Gini coefficient and reflects greater sensitivity to movements in the lower percentile groups. Corrections for continuity were included in the formula used to calculate the Gini coefficient but not for Theil's coefficient. However this would not significantly affect the comparisons in this table.

TABLE 8

COMPARISON OF GINI AND THEIL COEFFICIENTS

	Gini		Theil	
Series	1971	1977	1971	1977
C	0.80	0.74	0.63	0.49
D—lower variant	0.74	0.64	0.48	0.37
upper variant	0.79	0.70	0.54	0.42
E—lower variant	0.59	0.46	0.34	0.17
upper variant	0.64	0.51	0.36	0.19

5. *Analysis of Theil's Coefficient into Components*

Innumerable "models" of the distribution of wealth can be postulated, and corresponding to these there are various ways of splitting inequality into components. For example, one type of model could require the six combinations of sex and marital status in our tables to be conceived of as six quite separate populations but another model could regard them as embodying a cross-classification of sex and marital status effects.

Hence there are various types of analysis which might be carried out such as:

(a) a split into the "main effects" of age, sex and marital status and various "interactions" from which all types of analysis could be derived;

(b) separate analyses into variation between and within ages, sexes and marital statuses;

(c) other types of analysis reflecting specific types of model of the distribution of wealth, e.g. examining separately the distribution of wealth between specific age × sex × marital status cells.

Given a decomposable measure of inequality, it is always possible to split this into components for variation within groups relating to any one factor (such as age) and for variation between these groups. These components will add up to the overall measure, although they may be biased by other factors, e.g. if the proportion of males and females varies with age-group. If such proportions vary however a combined analysis which takes into account variation between ages, variation between sexes and any underlying interaction between these may produce coefficients which do not even add up to the total. With our data there is little difficulty with age and sex but when marital status is introduced it is impracticable to decompose the Theil coefficient into a comprehensive set of simple components.

Partly because of the complexity of adequately analysing and interpreting this situation and partly because of limits to the resources available for this work it was decided not to provide estimates of inequality within each specific age-group but to confine the analysis to the following:

(i) a split into variation between age × sex × marital status cells and that within these;

(ii) a split of variation between the above cells into that between sex, age and marital status respectively and that within these categories. The results are shown for Series C and Series E in Table 9. The estimates of total variation were obtained from the basic data relating to all individuals covered, the components were calculated separately from the data on the average wealth in the age × sex × marital status cells, and the estimates for variation within these cells were obtained by difference. For this analysis the lower variant assumption about ownership of occupational pension rights was adopted.

Sex and marital status play a smaller part than age in this picture. For marketable wealth age only accounts for 6 percent of the overall variation but when occupational and pension rights are added in this percentage rises dramatically to 31, as shown in Table 10 below: the addition of pension rights both considerably reduces the overall inequality and significantly increases the age component.

TABLE 9

ANALYSIS OF THEIL'S COEFFICIENT FOR 1977 BY COMPONENTS

Components	Theil's Coefficient	
	Series C	Series E
1. Overall split into main component and residual		
Between sex × marital status × age groups	0.044	0.055
Within the above	0.447	0.112
Total	0.491	0.167
2. Main component split into		
a. Between sexes	0.002	0.000
Within sex (between marital status and age groups)	0.042	0.055
Total	0.044	0.055
b. Between marital statuses	0.005	0.007
Within marital status (between sex and age groups)	0.039	0.048
Total	0.044	0.055
c. Between age-groups	0.029	0.052
Within age-group (between sex and marital status groups)	0.015	0.003
Total	0.044	0.055

TABLE 10

THEIL'S COEFFICIENTS, 1977: IMPORTANCE OF VARIATION BETWEEN AGE GROUPS

(1) Series	(2) Overall	(3) Between age-groups	(4) $\frac{(3)}{(2)}$ as %
A	0.375	0.018	5
C	0.491	0.029	6
D	0.359	0.042	12
E	0.167	0.052	31

It is apparent that Series A figures give a reasonable indication of the relative importance of age groups for marketable wealth and that there is no reason to reject the findings of published work on age-groups based on identified wealth.

These percentages are not unique of course as other decomposable coefficients would no doubt differ quantitatively. Nevertheless we feel that they should give a reasonable indication of the orders of magnitude involved.

D. SOME FURTHER COMMENTS

1. *The Distribution of Wealth on a Family or Household Basis*

The U.K. estimates relate to the distribution of wealth among individuals and not to that among combinations of individuals such as tax units, married

couples or households. They reflect the ownership of wealth, whereas if we are concerned with the enjoyment of wealth some other unit such as the household may be more appropriate.

No direct official estimates of the U.K. distribution of wealth are available on any combined basis, but the RCDIW ([16, paras. 229–233) tested out the effect of "marrying" husbands and wives using extreme assumptions—either marrying the rich to the rich and the poor to the poor or vice versa and then treating a married couple as a single unit, using Series B figures for 1972. The effects on the proportions of wealth held by the top 1, 5, 10, and 20 percentile groups were only small. However some caution is necessary in interpreting these findings for the following reasons.

(a) They only covered identified wealth.

(b) It seems likely that middle percentile groups would be more affected by this procedure than the top 20 percent.

(c) The transition from an individual basis will increase inequality in some respects and decrease it in others:

(i) Inequality between the households of the married, who constitute two-thirds of the adult population, will be less than that of the corresponding individuals: only if rich husbands were always married to rich wives and the poor to the poor would this inequality be unchanged.

(ii) It will be unchanged for comparisons between the single.

(iii) If married households are compared as such with single households inequality will be increased for comparisons between the married and the single. However it is arguable that instead of comparing total wealth of single households with total wealth of married households the latter should be reduced by some factor as at least two individuals are enjoying this wealth.

We are examining the possibility of using the results of a survey of the allocation between husband and wife of (taxable) investment income to produce alternative estimates on a family basis.

2. *Comparison of Total Wealth*

As the numbers of individuals in the various sex × marital status categories differ significantly the figures of average wealth will not always indicate the relative holdings of wealth by these groups. Table 11 shows total numbers and total holdings and Table 12 corresponding percentages.

The main features are as follows.

(i) Two-thirds of the adult population are married and own two-thirds of the wealth, whether or not pension rights are included.

(ii) Married males own a slightly higher proportion of wealth and married females a correspondingly smaller proportion of wealth.

(iii) A fifth of the adult population are single; these own a slightly smaller proportion of the wealth.

(iv) Widowers only account for 2 percent of the adult population and a similar percentage of the wealth. Widows account for 8 percent of the adult population and one and a half times this percentage of wealth.

TABLE 11

TOTAL NUMBERS AND TOTAL WEALTH OF ADULT POPULATION IN THE U.K. 1977

Sex	Marital status	Numbers (million)	Wealth (£ billions)		
			Series C	Series D	Series E
Male	Single	4.7	21	27	38
	Married	14.0	111	147	209
	Widowed	0.8	6	9	11
	Total	19.5	138	183	260
Female	Single	4.0	23	25	44
	Married	14.0	68	78	166
	Widowed	3.3	31	34	58
	Total	21.3	122	137	268
Total	Single	8.7	44	52	82
	Married	28.0	179	225	375
	Widowed	4.1	37	43	69
	Total	40.7	260	320	528

TABLE 12

PERCENTAGES OF NUMBERS AND PERCENTAGES OF WEALTH OF ADULT POPULATION IN THE U.K., 1977

Sex	Marital Status	Percentages of Numbers	Percentages of Wealth		
			Series C	Series D	Series E
Male	Single	11	8	8	7
	Married	35	43	46	40
	Widowed	2	2	3	2
	Total	48	53	57	49
Female	Single	10	9	8	9
	Married	34	26	24	31
	Widowed	8	12	11	11
	Total	52	47	43	51
Total	Single	21	17	16	16
	Married	69	69	70	71
	Widowed	10	14	14	13
	Total	100	100	100	100

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Appendix I. The Allocation of Adjustments from Series A to Series C to Sexes, Age-Groups and Marital Statuses

This appendix discusses how the various adjustments described by Dunn and Hoffman ([8], [9]) have been allocated to sexes, age-groups, and marital statuses, and how the adjustments affect their average wealth. It has not been possible to provide corresponding estimates of their effect on the distribution of wealth within specific age groups as this would have required considerable resources.

The transition from Series A to Series C involved two types of adjustment:

(a) adjustment of estate multiplier estimates for imperfections in timing, valuation etc;

(b) addition of excluded population and excluded wealth.

Tables A and B reproduce Tables 8 and 9 from the article in *Economic Trends* [9] which showed the effects of these adjustments on the concentration of wealth as measured by percentages owned by various percentile groups and as measured by the Gini coefficient.

Turning now to the average wealth of specific age-groups, the following adjustments were made.

1. *Time-Lags*

The basic estate multiplier data relate to year of assessment and not to year of death and require adjustment onto this basis. However there is little correlation between these time-lags and age-group, sex or marital status and no differential allocation has been required.

2. *Dropping of Smoothing and Use of Separate Multipliers for Each Marital Status*

Up to 1975 the U.K. estimates of identified wealth had involved estate multipliers for which some smoothing was done across age-groups. It was decided that it would be better to drop this but to use separate multipliers for each marital status. The Series C estimates provided by Dunn and Hoffman [3] made special adjustments for these changes but as they are now incorporated in the routine calculations no further adjustment is necessary. The published analyses by age-group for 1972, 1973 and 1974 used multipliers unsmoothed across age-groups but not allowing for marital status.

3. *Quality of Basic Data*

For estates below the taxable threshold there tends to be some undervaluation of certain types of property, in particular of dwellings. The ranges of wealth affected by this form a fairly constant proportion of the wealth of various age-groups but the proportion of dwellings is rather higher for married men than for the rest of the population and there is some variation between age-groups. These have been allowed for.

4. *Life Insurance Revaluation*

Life policies are valued in Inland Revenue statistics at paid up value which is appropriate on death but too high for the living and adjustment to an equity basis has been made using a schedule based largely on American research in this field.

Age group	*Equity assumed as percentage of maturity value*
Under 25	3
25–34	12
35–44	25
45–54	35
55–64	45
65–74	60
75–84	75
85 and over	80

5. *Consumer Durable Revaluation*

The Series C estimates revalue consumer durables at replacement value which is considerably higher than market value and the figures have been adjusted by a common factor. As the average value of consumer durables differs little between age-groups the valuation at replacement value tends to dilute differences between age-groups.

Excluded Population and Excluded Wealth

1. *Excluded Trust Property*

This consists of accumulation and maintenance settlements, which confer benefits on minors and very young adults, other discretionary trusts, which tend to benefit medium age-groups, and surviving spouse settlements, which relate mainly to widows but to a small extent to widowers. Taking these together all age-groups tend to benefit so that the aggregate effect on comparisons between age-groups is small.

a. *Accumulation and Maintenance Fund Property*

The overall value for 1977 is estimated at £2.8 billion of which £0.9 billion related to those between 18 and 24 and the remainder to minors. Almost all of this will be to single persons. It has been allocated to sexes *pro rata*.

b. *Other Discretionary Trust Property*

It is estimated that this amounted to £6.7 billion. No distribution by age-group is available but it seemed reasonable to allocate it more heavily to the lower and middle age-groups and *pro rata* to sex and marital status.

c. *Surviving Spouse Settlements*

The estimated value for these is £2.5 billion. They significantly increase the wealth of widows and of females as a whole. They have been allocated *pro rata* to the numbers of widows and *pro rata* to age-groups.

2. *Excluded Joint Property*

This is found in about 2 million medium-sized estates consisting of joint property (mostly owner-occupied housing) of a type which can pass on death without probate. No information is available on its subdivision by age group but as the average wealth of this group of individuals is fairly near that of the adult population as a whole it does not make much difference to the overall inequality of distribution of wealth. But, as the percentage of owner-occupiers varies to some extent with age-group, estimates of this subdivision have been made taking account of the number of owner-occupiers in each age-group whose real property is included in probate returns and similar allowances have been made for other types of property. Nearly all of this relates to married persons.

TABLE A

THE EFFECT OF THE ADJUSTMENTS ON THE CONCENTRATION OF WEALTH, 1975

Stage of Estimate	Percentages of Wealth owned by Percentage Groups of the Population included in the Estimates at each Range, Ranked in Descending Order of Wealth						
	Top 1%	1–2%	2–5%	5–10%	10–20%	20–25%	25–50%
Series A (identified population)	17.3	6.3	11.4	12.2	16.3	5.9	20.5
Series A adjusted successively for:							
Time-lags	17.2	6.4	11.1	11.7	15.8	5.9	20.5
Dropping of smoothing	16.7	6.2	11.2	11.7	15.8	6.0	20.8
Marital status multipliers	17.1	6.4	11.0	11.7	15.8	5.9	20.6
Quality of basic data	16.3	6.1	10.8	11.8	16.0	5.9	21.3
Life assurance revaluation	17.7	6.4	11.3	11.7	15.8	6.0	20.2
Consumer durables revaluation	17.1	6.2	10.8	11.6	15.8	5.8	20.9
As above, adjusted successively for excluded wealth of identified[1] population:							
Surviving spouse settlements	17.3	6.6	11.0	11.5	15.5	5.8	20.6
Accumulation and maintenance trusts	17.6	6.6	11.0	11.5	15.4	5.8	20.5
Other discretionary trusts	18.8	6.7	11.0	11.3	15.2	5.7	19.8
Excluded joint property	18.6	6.6	10.7	11.2	14.6	5.4	19.3
Addition of excluded small estates and their wealth: overall population (Series C)	23.5	7.0	13.3	14.2	18.2	7.1	10.0
Series B estimates (adult population aged 18 and over for comparison)	(23.8)	(8.3)	(15.6)	(16.2)	(20.1)	(6.4)	(9.6)

[1]Some beneficiaries of accumulation and maintenance trusts are in the excluded population.

TABLE B

THE EFFECT OF THE ADJUSTMENTS ON THE GINI COEFFICIENTS FOR 1971 AND 1975

Percentages

Stage of Estimation	1971		1975	
	Gini Coefficient	Adjust-ments	Gini Coefficient	Adjust-ments
Series A (for identified population)				
Adjustments for:	64		62	
Time-lags		+0.6		−1.6
Dropping of smoothing		—		−0.5
Marital status multipliers		−0.1		+0.4
Quality of basic data		−1.4		−1.0
Life assurance revaluation		+2.5		+2.1
Consumer durables revaluation		−2.5		−1.8
Adjusted Series A (for identified population)	63		60	
Excluded wealth of identified[1] population:				
Surviving spouse settlements		+1.8		+1.6
Accumulation and maintenance trusts		+0.6		+0.3
Other discretionary trusts		+1.8		+1.8
Excluded joint property		−1.8		−1.8
Adjusted figure before adding on excluded small estates	65		62	
Addition of excluded small estates and their wealth		+15		+14
Series C	80		76	
Series B (adult population aged 18 and over, for comparison)	(83)		(80)	

[1]Some beneficiaries of accumulation and maintenance trusts are in the excluded population.

APPENDIX II: BIBLIOGRAPHY OF EARLIER EMPIRICAL STUDIES OF WEALTH/AGE DATA

Item	Years Covered	Definition of Wealth	Scope of Analysis	Source of Data	Reference
a.	1953	Net worth of income units, excluding chattels and insurance policies	Mean net worth per income unit by age of head of income unit (aged 18 and over) distributed among liquid assets, own home, other assets and liabilities, Great Britain	1953 Survey of Personal Incomes and Savings—Oxford Institute of Statistics	H. F. Lydall, The Life Cycle in Income, Saving and Asset Ownership, *Econometrica*, April 1955
b.	1954	Net marketable wealth based on decedent's estate definition (including insurance policies at estate duty valuation)	Mean wealth per person (aged 20 and over) Great Britain	Inland Revenue estate duty statistics	H. F. Lydall and D. G. Tipping, The Distribution of Personal Wealth in Britain, *Bulletin of the Oxford University Institute of Statistics*, February 1961
c.	1963–67	Net marketable wealth based on decedent's estate definition (including insurance policies at estate duty valuation)	i. Distribution of wealth by age group, males, females aged 25 and over "identified" by estate multiplier method, Great Britain (Series A) (ii) Coverage in (i) plus adjustments for missing estates	Inland Revenue estate duty statistics	A. B. Atkinson, The Distribution of Wealth and the Individual Life Cycle, *Oxford Economic Papers*, July 1971

(*continued*)

APPENDIX II: BIBLIOGRAPHY OF EARLIER EMPIRICAL STUDIES OF WEALTH/AGE DATA—(*continued*)

Item	Years Covered	Definition of Wealth	Scope of Analysis	Source of Data	Reference
d.	1923 1930–38 1950 1960 1970	Net marketable wealth based on decedent's estate definition (including insurance policies at estate duty valuation)	Modified version of c(ii) above	Inland Revenue estate duty statistics	A. B. Atkinson and A. J. Harrison, *The Distribution of Personal Wealth in Britain*, Cambridge University Press 1978
e.	1972	Net marketable wealth based on decedent's estate definition (including insurance policies at estate duty valuation)	(i) Distribution of "identified" wealth by age group, males and females combined, all ages, Great Britain (Series A) (ii) Distribution at (i) extended to include excluded population on zero wealth assumption (Series B)	Inland Revenue estate duty statistics	A. J. Astin, The Distribution of Wealth and the Relevance of Age, *Statistical News*, February 1975
f.	1954 (From b) 1963–67 (From b) 1972 (From e) 1973–1975	Net marketable wealth based on decedent's estate definition (including insurance policies at estate duty valuation)	As e(ii), males and females separately (except 1954), and combined, from age 25, Great Britain (except 1974–75 United Kingdom)	Inland Revenue estate duty statistics	Royal Commission on the Distribution of Income and Wealth, Report No. 4 (Cmnd 6626), July 1975
g.	1975	(i) As b above (ii) As b with life insurance adjustment	As c(i)	Inland Revenue estate duty statistics	A. F. Shorrocks, *Life insurance and asset holdings in the United Kingdom*, D. Currie, D. Peel and W. Peters, Editors, *Microeconomic Analysis*: London, Croom Helm, 1981