

Poverty and Debt
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Summary

1. There is widespread concern about rising levels of debt prompted by the rising overall levels of debt and the increasing reports of people having difficulties in managing their debts.
2. Analysis of the data on wealth and borrowing in the British Household Panel Survey in 1995 and 2000 finds that the non-mortgage debts of households headed by people aged under 35 are higher than those of households headed by older people.
3. However when one looks only at the households with unsecured debt, then the group of households headed by people aged 35-50 held more debt than did households headed by younger and older people.
4. Unsecured debts of people in poverty were as a proportion of their incomes, considerably higher than those of the population at large but, at around 10% of income the burden was not large in absolute terms. The average reported debts of people experiencing unemployment were at worst only slightly larger. Econometric analysis suggested that unsecured debt levels were raised by 4% of income for households below the poverty line.
5. Divorced women and single women with children had, on average very low levels of wealth but they did not have particularly large debts. The same was true of households created by family breakdown between 1995 and 2000. Only households whose heads described themselves as separated had relatively large unsecured debts, at just under 25% of their incomes on average. Our econometric analysis suggested that recent family breakdown raised debt as a proportion of income by 42% but the reliability of this finding is affected by the small number of households experiencing breakdown and the finding is not statistically significant.
6. There is evidence that taking on debt is in part motivated by an expectation of rising income in the near term. A household expecting its income to rise by 50% over the next two years would, on average, take extra unsecured debt of 5.8% of current income and total extra debt of 28% of current income compared with a household which does not expect its income to rise.
7. A life-cycle framework is used to investigate the borrowing and saving patterns households would adopt if they planned to keep their spending growing smoothly up age 65 and staying constant after that. This shows that between 1995 and 2000, if all households had followed the framework then, before taking initial assets and liabilities into account, 18% of households would have borrowed or dissaved and 6% would have borrowed or dissaved more than one year's income.
8. This borrowing is a consequence of expectations of rising income; the data show that the income of this group did indeed rise relative to the average over the period 2000-2002
9. A much higher proportion of people in poverty would have needed to borrow to smooth out their expected consumption. 53% of households in poverty in 1995 would have reached 2000 having borrowed or dissaved and 28% would have borrowed more than one year's income. Again the incomes of this group rose relative to the average over the period 2000-2002.
10. Overall changes in people's asset positions are only partially influenced by life-cycle factors. There also seems to be a tendency to spend out of existing wealth but, offsetting this, to let house price gains accrue.

11. Many people who would have benefited from reducing their wealth or going into debt over the period 1995 to 2000 actually let their wealth increase. However people who actually reduced their wealth between 1995 and 2000 tended to do it by considerably more than the life-cycle model suggests.
12. A general finding from this study is that there seems to be a large group of people and particularly people in poverty who would have been substantially helped by better access to credit; they were unable or unwilling to borrow despite the fact that they could reasonably expect rising incomes and those expectations, at least on average, seemed to be fulfilled

1 Introduction

In the United Kingdom there is growing concern about household debt. Aggregate levels of debt have risen from 16% of GDP in 1950 to about 90% of GDP by 2004. These figures are, of course averages and there is also concern that some people have debt levels much higher than the average; very high debt levels can be a cause of distress and occasionally suicide. Recent evidence suggests that the number of people facing difficulties because of debt levels is rising¹. Secondly there is concern that, even if people with high incomes can borrow and service much larger debts than poor people, that ready access to credit may be particularly attractive to poor people so that problems of debt are also likely to be problems of poverty. While much of the popular focus assumes that debt problems are caused by high levels of borrowing, it is important not to lose sight of the fact that they may also be caused by bad luck. A level of debt which may be perfectly manageable in the absence of a shock to income will become unmanageable if income levels fall sharply, perhaps because of relationship break-down or unemployment.

Much of the work on household indebtedness in the UK has been based on studies of people who have problems with debt (Edwards 2003). Her study, for the Citizens' Advice Bureaux suggested that common factors behind debt problems are job loss, ill health, relationship breakdown and 'over-commitment and poor money management'. However, studies of this type based on a self-selecting sample do not shed any light on the overall presence or absence of indebtedness and can provide only partial information on the factors behind problems with indebtedness. Other studies have provided a macro-economic picture of the growth in household arrears (Whitley et al. 2004), looking at the proportion of households in arrears rather than trying to explain any similarities between those households which are in arrears. Bridges & Disney (2004) look at information on arrears of household debt from the 1999 Survey of Low-income families and fit a model which explains jointly the probability of having arrears (45 % of households in the survey) and, given the existence of arrears, their magnitude.

This is inevitably a snap-shot view whereas we are more interested in the change in indebtedness over time so as to have a better understanding of the factors leading to indebtedness. The British Household Panels Survey provides information on asset and debt holdings in 1995 and 2000. Banks et al. (2002) provide a general account of the data on financial assets and liabilities as reported in the 2000 survey with some comparisons with 1995. Del-Rio & Young (2003) use these data to investigate the factors driving the take-up of unsecured debt and also study changes in indebtedness of households. They find, from the same data set as we use in this study, that 41% of people who were highly indebted in 1995 were also highly indebted in

¹For example the number of people seeking advice from Citizen's Advice Bureaux has risen from 406,000 to 707,600 between 1996/7 and 2003/4 (see <http://www.citizensadvice.org.uk/winnn6/press-041020>)

2000 while 78% of people with no unsecured debt in 1995 still had no debt in 2000. They model the change in indebtedness of households between 1995 and 2000 finding that the statistically significant factors behind increasing debt were increased income (for people with low incomes in 1995), expectations of a better financial situation and an increase in educational qualifications. People aged 45 and older tended to reduce their debts relative to younger people, with those over 60 making a larger reduction than those aged 45-59. Becoming self-employed was also a statistically significant factor in increasing unsecured debt. McKay & Kempson (2003) look at the influence of "life events" on savings behaviour and therefore implicitly on the change in asset holding. They do not, however, put this in the context of the influence of these events on expected future income growth and thus do not distinguish those life events which have a temporary effect on income from those with a permanent effect; the implications for savings are likely to differ.

The analysis we present here builds on this work. We study asset holding and borrowing in the United Kingdom with a particular focus on its interaction with poverty defined, in this paper as an income of below sixty per cent of median household income after adjusting household income for family size. However, we are also keen to analyse debt levels in an appropriate context. The basic life-cycle framework (Browning & Crossley 2001), the standard tool used by economists to analyse borrowing and saving behaviour, suggests that rational consumers who face reasonable interest rates will use saving and borrowing to smooth out fluctuations in their incomes. Once one makes the assumption that consumption has declining marginal utility, that £1 of extra consumption is worth more to someone when their spending level is low than when it is high, it follows immediately that a rational consumer will want to use saving and borrowing as a buffer to ensure that consumption levels are protected from temporary income shocks, a proposition explored in one particular form by Alessie & Lusardi (1997). It is also true that people who expect their income to rise over their working lives, or at least over the first part of them, will sensibly incur debts when they are young to be repaid out of their higher incomes when they are older. Thus there is no reason to believe that appropriate debt levels are zero or even that today's levels of debt are, in the round, anything to be concerned about. We conduct our analysis against the benchmark of the life-cycle model. But, unlike studies which simply "test" the model we aim to explore the characteristics of people who deviate from it, identifying their circumstances. Thus we can see whether households with incomes below the poverty line save less or more than the life-cycle model indicates that they might.

Our analysis is based round the study of households rather than individuals. The reason for this is that in many well-functioning households, whatever the nominal ownership of assets such as a house, it is in practice likely to be regarded as the joint property of the more than

one member of the household (and in a nuclear family of the two adult members). There is also likely to be a pooling of at least some income with household expenses addressed communally. Thus, in common with a number of other authors (Alessie & Lusardi 1997, Banks et al. 2002) we treat the household² as the unit of reference. We focus our attention on households headed by people of working age.

We begin by discussing and summarising our data sources.

2 The British Household Panel Survey

The British Household Panel Survey (BHPS) has been conducted since 1991 collecting data annually from a panel of about five thousand households. The data collected include information on the incomes and deductions from income of individual members of the household and a wide range of socio-economic data such as age, marital status and educational background. The survey collects information on a number of different components and definitions of income. The measure we work from is calculated as net household income by Bardasi & Jenkins (2004). This represents labour income net of taxes, national insurance and employees pension contributions but gross of earnings-related tax credits plus pension income, investment income and social benefits. The measure is not completely net because it is not clear whether these other forms of income are shown net or gross. In particular, high-rate tax payers receiving investment income are likely to face tax charges which are not shown in the data. Nevertheless it is widely used and is probably accurate for most people in the survey. However, from this we deduct reported investment income because our analytical framework imputes investment income on the basis of household asset ownership. To include it also in the measure of income would be double counting.

In 1995 and 2000 respondents were asked about their wealth and financial liabilities. These responses are likely to be more reliable than those traditionally found in cross-section surveys of financial asset-holding, because they were first asked four years into the survey and after the confidence of respondents had built up. Although the wealth data suggest wealth aggregate levels of wealth lower than those shown in the national balance sheet, this difference can be accounted for by slight under-representation of very wealthy people in the survey, and does not in itself suggest that the data are inherently inaccurate.

The first wave of the survey provided information on a full range of demographic and economic data on 2711 households and these form our initial population when we come to

²Banks et al. (2002) suggest that the ‘benefit unit’, the group of individuals used in assessing entitlement to social security benefits, may be more appropriate than the household as a tool for analysis. However, they note that 82% of households in the survey contain only one benefit unit and the distinction is therefore not of great overall importance.

study determinants of households being debtors or holding wealth in section 5. There were 2858 households with income and asset data in both 1995 and 2000. These form the population which we study in the next section. However our main focus is on households whose heads were under 65 in 2000. 2008 of the 2858 households fall into this category. Of these only 1056 provided data on wealth and income in all years of the survey. However we found that 69 provided entries in some years which were zero or very close to zero, and our econometric analysis of income dynamics which we use to assess the extent to which households' views of future income might influence borrowing was therefore carried out on 987 households. Obviously only subgroups of these had borrowed either secured or unsecured debt.

3 Income and Wealth as shown in the British Household Panel Survey

We begin by presenting in table 1 a summary of the data in the BHPS. The figures we show are the means of household data evaluated after dividing by household size. For this we have used McClements' scale based round a figure of one representing a household of two adults. Thus they can be thought of as being 'per couple' rather than per person. They are evaluated at prices of 2000. The definitions of wealth we have used follow those of the BHPS. In particular it is important to remember that net financial wealth is defined gross of mortgage debt and excludes savings in occupational pension schemes. Housing wealth is calculated as the value of housing owned less any outstanding mortgage. Thus total indebtedness is calculated as outstanding mortgage commitments less net financial wealth.

The first two columns of table 1 show the sort of pattern to be expected from a panel survey. The average age of the household head has increased by just under five years between the two surveys. Outstanding mortgages have been reduced because, as people age they tend to pay down their mortgages; this effect has dominated the increased cost of housing which would tend to raise mortgage commitments of people moving. There has been a sharp increase in housing wealth as house prices recovered from the trough of the first half of the 1990s.

Data on income and, even more so on wealth are likely to be skewed, with the means of both raised by a small number of very high earners and very wealthy people. Attention is therefore often focused on the median income as a better guide to the circumstances of the ordinary person. However wealth and debt need not be closely related to income and there is a risk that the household receiving median income may have unrepresentative holdings of wealth. We therefore show, instead of income and wealth of the household receiving median income, the mean value of the mid-quintile of households ranked by income. The mean values for this

quintile are markedly below the overall mean reflecting the skewness discussed above. But the same effects are visible; people have reduced their debt and housing wealth has increased as a result of rising house prices. Non-mortgage debt has been allowed to rise as some people have made more use of such lending arrangements.

Data in £2000	All Households		Mean of mid-Quintile	
	2000	1995	2000	1995
Age	53.99 (.31)	49.03 (.31)	54.40 (.70)	48.68 (.65)
Net Income	18871 (251)	17766 (223)	16331 (332)	15219 (53)
Non-mortgage Debt	1219 (74.11)	1042 (92.38)	1057 (90.08)	919 (151.93)
Mortgage	17904 (674)	18667 (741)	12506 (1294)	14031 (875)
Total Debt	19123 (697)	19709 (768)	13563 (1335)	14950 (899)
Net Financial Wealth	9792 (681)	10300 (906)	7242 (934)	5844 (1164)
Housing Wealth	65336 (1578)	42639 (1214)	60366 (2875)	41259 (2469)
Total	75128 (1895)	52939 (1731)	67609 (3298)	47103 (3044)
Size	1.07 (.01)	1.04 (.01)	1.12 (.02)	1.13 (.02)
P (Married)	.55 (.01)	.54 (.01)	.60 (.02)	.60 (.02)
P(Co-habiting)	.07 (.00)	.08 (.00)	.06 (.01)	.07 (.01)
P(Divorced)	.11 (.01)	.11 (.01)	.11 (.01)	.10 (.01)
P(Widowed)	.14 (.01)	.13 (.01)	.12 (.01)	.11 (.01)
P(Single)	.12 (.01)	.14 (.01)	.12 (.01)	.12 (.01)
No. of Observations	2858			

Note: Standard errors of cell means shown in brackets. Income and wealth data are measured per effective household with household size evaluated using McClement's scale normalised so that an adult couple counts as one. Household size is also defined on this basis.

Table 1: Summary of the Data on Wealth and Debt

In table 2 we show figures for the households whose heads were under 65 in 1995. The picture is very similar to that of the whole population. However the growth of household income has been greater and the increase in housing wealth more marked. This last effect largely reflects the fact that the mean household under 65 is more heavily geared than the

mean of the population as a whole. There is the same decumulation of mortgage debt, but the increase in non-mortgage debt is more pronounced.

Data in £2000	All Households		Mean of mid-Quintile	
	2000	1995	2000	1995
Age	44.98 (.23)	40.02 (.23)	45.89 (.49)	41.20 (.51)
Net Income	20451 (321)	18934 (274)	18174 (63)	16554 (63)
Non-mortgage Debt	1666 (103)	1396 (129)	1599 (234)	1131 (134)
Mortgage	24890 (893)	25619 (978)	19251 (1162)	24361 (3219)
Total Debt	26556 (922)	27015 (1011)	20850 (1242)	25492 (3220)
Net Financial Wealth	6467 (637)	6346 (888)	4717 (883)	2866 (617)
Housing Wealth	57863 (1738)	32111 (1258)	51979 (2993)	28189 (3107)
Total	64330 (2004)	38457 (1721)	56696 (3383)	31056 (3314)
Size	1.18 (.01)	1.14 (.01)	1.21 (.02)	1.20 (.02)
P (Married)	.62 (.01)	.59 (.01)	.68 (.02)	.66 (.02)
P(Co-habiting)	.09 (.01)	.11 (.01)	.06 (.01)	.07 (.01)
P(Divorced)	.13 (.01)	.12 (.01)	.10 (.02)	.10 (.02)
P(Widowed)	.03 (.00)	.03 (.00)	.03 (.01)	.02 (.01)
P(Single)	.13 (.01)	.15 (.01)	.12 (.02)	.14 (.02)
No. of Observations	2008			

See notes to table 1

Table 2: Summary Statistics for Households with Heads under 65 in 2000

These data discussed above relate to the whole panel. In table 3 we show cross-sections for particular age groups rather than a particular panel moving through time. It can be seen that the average ages of the populations selected are much the same in the two years. The mean income figures show household income after adjusting for size almost independent of age. Nevertheless people in the 35-49 bracket live in larger households than do the younger and older people and thus the absolute incomes of these households are also augmented in proportion to their increased size.

Unlike the figures for the complete panel, these data do not show mortgage debt being run down; indeed people in the older and middle brackets borrowed substantially more in 2000 than in 1995, with total debt increasing more than in proportion to income. It is surprising that this is not also apparent in the 20-34 age group. However it must be remembered that the standard errors, shown in brackets under the data themselves, are substantial. It is perfectly possible that the mean of the population as a whole would show a marked increase in debt.

Data in £2000	2000				1995			
	Age Group				Age Group			
	20-34	35-49	50-64	65+	20-34	35-49	50-64	65+
Age	29.91 (.17)	41.64 (.14)	56.48 (.15)	75.26 (0.23)	28.72 (.15)	41.75 (.15)	56.46 (.17)	72.82 (0.22)
Net Income	19666 (621)	20728 (563)	20484 (431)	15140 (339)	18865 (496)	18997 (432)	19097 (462)	14000 (354)
Non-mortgage Debt	2215 (277)	2111 (177)	843 (105)	163 (36)	1755 (203)	1461 (237)	720 (139)	118 (41)
Mortgage	31177 (1929)	31060 (1346)	14125 (1423)	1399 (473)	31140 (1491)	26956 (1200)	12664 (2040)	1673 (810)
Total Debt	33392 (1978)	33171 (1401)	14968 (1449)	1562 (476)	32895 (1515)	28418 (1313)	13384 (2049)	1791 (844)
Net Financial Wealth	1182 (778)	4659 (710)	11291 (1432)	17647 (1700)	925 (396)	6147 (1312)	16740 (2687)	19158 (2218)
Housing Wealth	23322 (2114)	51381 (2313)	82724 (3392)	82990 (3288)	11665 (1368)	33754 (1622)	66571 (3278)	63323 (2755)
Total	24504 (2474)	56040 (2602)	94015 (3961)	100637 (4140)	12590 (1478)	39901 (2326)	83311 (4846)	82481 (4023)
Size	1.07 (.02)	1.28 (.01)	1.10 (.01)	0.82 (.01)	1.00 (.01)	1.25 (.01)	1.07 (.01)	0.79 (.01)
No. of Observations	356	918	734	850	655	866	656	654

See notes to table 1

Table 3: Wealth Classified by Age

The effects of the passage of time can be shown by comparing the age groupings in table 4 with those shown in table 3 for 1995. Since the groups are aged by five years in table 4 comparison of these two data effectively shows the income and wealth of the same groups of people. We can see that the younger groups, aged 20-34 and aged 35-50 in 1995, increased their unsecured borrowing while the older groups reduced theirs. Mortgage borrowing of the three older groups fell between 1995 and 2000 while housing wealth and total wealth increased sharply.

Data in £2000	25-39	40-54	55-69	70+
Age	33.71 (0.15)	46.76 (0.15)	61.56 (0.17)	77.85 (0.23)
Net Income	20431 (469)	21233 (585)	18896 (452)	14246 (354)
Non-mortgage Debt	2386 (207)	1605 (165)	567 (82)	125 (40)
Mortgage	34872 (1689)	25266 (1217)	8326 (1399)	752 (194)
Total Debt	37258 (1730)	26871 (1278)	8893 (1414)	878 (200)
Net Financial Wealth	1656 (576)	6735 (870)	15919 (1926)	16425 (1811)
Housing Wealth	34381 (2381)	60967 (2664)	90859 (3603)	78860 (3664)
Total Wealth	36037 (2624)	67702 (2963)	106778 (4700)	95284 (4390)
Size	1.15 (0)	1.27 (0)	1.01 (0)	0.78 (0)
No. of Families	658	869	658	647

See notes to table 1

Table 4: Wealth Classified by Age: the 1995 Age Groups Advanced Five Years

3.1 Households with Unsecured Debt

The data presented above are for all households whether or not they have any unsecured debt. In tables 5 and 6 we limit ourselves to people who report unsecured debt as well as outstanding mortgages. The incomes of this group are higher than those in the population as a whole but it can also be seen that the levels of unsecured debt are much higher. In the whole population in the age groups 20-34 and 35-49 unsecured debt is about 10% of annual income in 2000. Among those who actually have unsecured debts the level rises to around 20% of annual income, increasing from around 15% in 1995. Thus people who borrowed were certainly borrowing on a larger scale in 2000 than in 1995.

Data in £2000	20-34	35-49	50-64	65+	All
Age	29.89 (.22)	41.29 (.20)	55.79 (.27)	71.30 (.69)	44.18 (.39)
Net Income	20210 (719)	20995 (947)	20661 (743)	17632 (1105)	20522 (519)
Non-mortgage Debt	3641 (443)	4186 (322)	2786 (309)	2159 (405)	3607 (199)
Mortgage	32518 (2517)	34373 (1750)	20069 (2343)	3335 (1289)	28576 (1181)
Total Debt	36159 (2604)	38559 (1891)	22855 (2481)	5494 (1345)	32183 (1259)
Financial Wealth	-611 (902)	68 (633)	4237 (1025)	8978 (2644)	1483 (476)
Housing Wealth	19788 (2258)	43171 (2763)	69835 (5385)	100194 (14183)	48088 (2224)
Total Wealth	19177 (2689)	43239 (3041)	74073 (5699)	109172 (15185)	49571 (2421)
Size	1.06 (.02)	1.30 (.02)	1.13 (.03)	.92 (.04)	1.18 (.01)
No. of Observations	208	463	222	64	957

See notes to table 1

Table 5: Households with Unsecured Debt in 2000

Data in £2000	20-34	35-49	50-64	65+	All
Age	28.63 (.19)	41.40 (.22)	55.39 (.29)	70.00 (.58)	40.48 (.38)
Net Income	19426 (600)	18685 (547)	19277 (683)	15131 (988)	18806 (339)
Non-mortgage Debt	2916 (326)	2943 (467)	2499 (458)	1352 (451)	2748 (236)
Mortgage	31715 (1999)	28353 (1714)	15734 (2846)	11865 (9177)	26268 (1230)
Total Debt	34631 (2047)	31297 (2015)	18233 (2907)	13217 (9565)	29016 (1323)
Financial Wealth	-644 (508)	2091 (1185)	9144 (2127)	16292 (5422)	3059 (702)
Housing Wealth	10305 (1802)	26010 (1802)	59053 (6066)	59776 (12133)	27508 (1670)
Total Wealth	9661 (1914)	28102 (2647)	68196 (6872)	76068 (15288)	30567 (2040)
Size	1.01 (.02)	1.27 (.02)	1.10 (.03)	.87 (.04)	1.12 (.01)
No. of Observations	391	430	189	57	1079

See notes to table 1

Table 6: Households with Unsecured Debt in 1995

3.2 Home Ownership and Asset Holding

We now look at figures for other subcategories of households. In tables 7 and 8 we show, broken down by age, the position of households owning houses in 1995 and 2000. The incomes of these, adjusted for family size, are higher than those of the population as a whole. Their wealth is similarly augmented, with the greatest wealth owned by households with heads aged 65 or more; they show the same pattern as the figures for the whole population with wealth increasing by age and both mortgage and non-mortgage debt declining with age. Measured in prices of 2000, these data show the average mortgage of households aged 20-34 declining slightly. However, as we commented when looking at the whole population, the standard deviations indicate that these data are subject to substantial uncertainty.

Data in £2000	20-34	35-49	50-64	65+	All
Age	30.45 (.19)	41.68 (.16)	56.40 (.17)	74.27 (.26)	53.36 (.34)
Net Income	23068 (803)	22210 (670)	21831 (492)	16537 (451)	20676 (313)
Non-mortgage Debt	2483 (399)	2207 (199)	890 (114)	208 (51)	1331 (90)
Mortgage	48376 (2336)	37765 (1551)	17085 (1713)	2062 (707)	23510 (862)
Total Debt	50859 (2378)	39971 (1612)	17974 (1739)	2270 (710)	24841 (888)
Financial Wealth	2480 (1232)	5481 (836)	13259 (1732)	21763 (2127)	11708 (826)
Housing Wealth	37243 (3050)	63740 (2677)	101708 (3763)	124193 (3898)	87822 (1891)
Total Wealth	39723 (3628)	69222 (3023)	114966 (4440)	145956 (5062)	99530 (2292)
Size	1.07 (.02)	1.30 (.01)	1.14 (.02)	.86 (.01)	1.11 (.01)
No. of Observations	220	740	597	568	2125

See notes to table 1

Table 7: Households owing Houses in 2000

The analogous figures for households who do not own houses are shown in tables 9 and 10. Given that the incomes of house-owners were higher than the averages for the population, it is no surprise that these data show lower incomes and lower wealth. Some respondents report mortgages even though they are not house-owners. The explanation of this is likely to be that they are paying the mortgage on some other property such as that occupied by a separated spouse. Small amounts of positive housing wealth are reported in 1995, probably for the same reason. This group has seen its non-mortgage debt increase among households with heads

Data in £2000	20-34	35-49	50-64	65+	All
Age	29.40 (.18)	41.70 (.17)	56.36 (.19)	71.90 (.25)	49.11 (.34)
Net Income	22660 (661)	20284 (475)	20700 (536)	15892 (504)	19968 (274)
Non-mortgage Debt	1961 (298)	1568 (288)	686 (96)	164 (65)	1134 (119)
Mortgage	49322 (1868)	32718 (1378)	15802 (2536)	2624 (1268)	25603 (985)
Total Debt	51283 (1899)	34286 (1521)	16488 (2544)	2788 (1323)	26737 (1021)
Financial Wealth	1858 (600)	7235 (1601)	20720 (3333)	25788 (3080)	13369 (1211)
Housing Wealth	19566 (2080)	41963 (1854)	83179 (3766)	97705 (3140)	59319 (1523)
Total Wealth	21424 (2234)	49197 (2734)	103899 (5718)	123493 (5008)	72688 (2224)
Size	.99 (.01)	1.27 (.01)	1.10 (.02)	.83 (.01)	1.08 (.01)
No. of Observations	407	704	524	417	2054

See notes to table 1

Table 8: Households owing Houses in 1995

under 50; as a proportion of income it is slightly higher than that of house-owners. The total wealth of the group is very small by comparison with that of the house-owners, indicating the importance of house-ownership as a determinant of wealth status. At the same time it must be remembered that the nature of the welfare state is such that, for people on low incomes, the state plays for people on low incomes the role played by wealth for people on high incomes. It provides support for them on retirement or during periods of temporary loss of employment income at a level reasonably commensurate with their employment income; people with higher incomes are not supported by the state in this way and have to rely on holdings of wealth.

Data in £2000	20-34	35-49	50-64	65+	All
Age	29.24 (.31)	41.47 (.33)	56.82 (.37)	76.95 (.45)	55.64 (.73)
Net Income	13927 (769)	14567 (631)	14615 (667)	12517 (442)	13688 (298)
Non-mortgage Debt	1662 (340)	1715 (384)	639 (261)	75 (38)	879 (128)
Mortgage	2001 (969)	3185 (1105)	1228 (955)	68 (57)	1419 (377)
Total Debt	3663 (1156)	4900 (1335)	1867 (1190)	143 (69)	2298 (460)
Financial Wealth	-853 (380)	1240 (1128)	2717 (1131)	8801 (2719)	4005 (1096)
Housing Wealth	.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)	0 ()
Total Wealth	-853 (380)	1240 (1128)	2717 (1131)	8801 (2719)	4005 (1096)
Size	1.09 (.03)	1.20 (.04)	.94 (.03)	.72 (.01)	.95 (.02)
No. of Observations	127	178	137	268	710

See notes to table 1

Table 9: Households not owing Houses in 2000

Data in £2000	20-34	35-49	50-64	65+	All
Age	27.76 (.26)	41.93 (.34)	56.78 (.38)	74.14 (.43)	48.60 (.71)
Net Income	12915 (543)	13407 (916)	12361 (480)	10673 (317)	12215 (292)
Non-mortgage Debt	1419 (223)	1000 (203)	863 (582)	39 (14)	814 (128)
Mortgage	1338 (593)	1917 (753)	209 (150)	 ()	975 (274)
Total Debt	2757 (644)	2917 (813)	1072 (599)	39 (14)	1789 (309)
Financial Wealth	-584 (346)	1421 (798)	946 (996)	6450 (2731)	2124 (828)
Housing Wealth	-1338 (593)	-1917 (753)	-209 (150)	 ()	-975 (274)
Total Wealth	-1922 (701)	-497 (1054)	736 (1009)	6450 (2731)	1149 (874)
Size	1.04 (.03)	1.18 (.04)	.98 (.04)	.73 (.01)	.96 (.01)
No. of Observations	241	162	131	224	781

See notes to table 1

Table 10: Households not owing Houses in 1995

3.3 Poverty, Unemployment and Asset Holding

	In Poverty in 2000		In Poverty in 1995	
	2000	1995	2000	1995
Age	44.21 (.75)	41.84 (.80)	42.10 (.64)	40.18 (.72)
Net Income	7069 (145)	11314 (447)	12844 (437)	6313 (112)
Non-mortgage Debt	752 (180)	1054 (317)	1274 (208.44)	702 (136.04)
Mortgage	10152 (1580)	9586 (1256)	11535 (1604)	8208 (1714)
Total Debt	10904 (1624)	10640 (1333)	12809 (1741)	8910 (1792)
Financial Wealth	3499 (1164)	1378 (811)	795 (540)	461 (318)
Housing Wealth	38612 (4470)	31987 (3570)	28737 (3401)	19258 (2797)
Total Wealth	42112 (4931)	33365 (3836)	29532 (3571)	19718 (2918)
Size	1.17 (.03)	1.07 (.02)	1.19 (.03)	1.12 (.02)
P(married)	.39 (.02)	.42 (.02)	.34 (.02)	.34 (.02)
P (Couple)	.04 (.01)	.06 (.01)	.07 (.01)	.06 (.01)
P (Divorce)	.18 (.02)	.15 (.02)	.18 (.02)	.17 (.01)
P (Widowed)	.26 (.02)	.23 (.02)	.28 (.02)	.26 (.02)
P (Single)	.13 (.02)	.14 (.02)	.14 (.01)	.18 (.02)
No of observations	473		561	

See notes to table 1

Table 11: Wealth Statistics for Households in Poverty in 1995 and 2000 with Heads aged under 65 in 2000

We also show, in table 11 the circumstances of households headed by someone under 65 and receiving then less than 60% of median income, i.e. households headed by someone of working age and in poverty. Since people in poverty in 1995 may not also be in poverty in 2000 this can be looked at from two perspectives. We show the financial details in both 1995 and 2000 for households in poverty in 1995 and also for households in poverty in 2000. It can be seen that the households in poverty in 1995 have experienced a much sharper jump in their mean income than did the population as a whole. This reflects the fact that, for many people,

poverty is a temporary and not a permanent state of affairs. Nevertheless, even by 2000 their incomes remain well below those of the mean of the middle quintile. Such people have seen their non-mortgage debt rise to the population mean in 2000 although their capacity to manage such debts is obviously lower. People in such circumstances have also made much more use of mortgage debt with outstanding mortgages rising by over 1/3 in real terms. Net holdings of financial wealth are very small. Housing wealth and therefore total wealth have, however, increased sharply. Levels of non-mortgage debt measured relative to income, at around 10%, are not very different from those of the population as a whole. The income movements of the households in poverty in 2000 are the obverse of this. On average they have seen sharp falls in their incomes since 1995. The non-mortgage debt of such households has fallen while the mortgage debt has increased slightly. Net financial assets (financial assets less non-mortgage debt) have, however, also increased slightly. This may reflect redundancy payments associated with income loss but it has to be observed that the effect is not found in the data for the households in poverty in 1995.

People who have suffered unemployment represent another group which might be subject to increasing and high levels of debt. In table 12 we show similar figures for two categories of people who have experienced unemployment. In the first two columns we show the circumstances in 1995 and 2000 of households whose heads have experienced unemployment at any time between 1995 and 2000 inclusive. In the third and fourth columns we show the circumstances of people who reported unemployment in the surveys in 1995 and 2000 respectively. Despite the fact that people are not recorded as unemployed once they are over sixty-five, the population of unemployment-reporting households has aged by the five years over which the panel has moved.

Comparing their circumstances with those in table 2 we can see that the net incomes of the households experiencing unemployment at any time are depressed; not surprisingly those of the households reporting unemployment in the survey year are more depressed. We see the same pattern of debt repayment associated with ageing which was noted in the population at large; increased use of non-mortgage debt is pronounced but, at the same time the sizeable standard error has to be noted.

Data in £2000	Unemployed in any Year		Unemployed in Year Shown	
	2000	1995	2000	1995
Age	51.37 (1.01)	46.39 (1.00)	54.93 (2.56)	49.89 (2.30)
Net Income	18640 (751)	17443 (729)	16626 (1213)	15892 (1288)
Non-mortgage Debt	1806 (343)	1025 (162)	1220 (522)	809 (222)
Mortgage	18442 (1796)	18697 (1679)	17142 (5315)	17800 (3737)
Total Debt	20248 (1917)	19722 (1705)	18362 (5455)	18609 (3805)
Net Financial Wealth	7369 (1869)	7910 (3051)	6365 (2047)	1449 (812)
Housing Wealth	51927 (3590)	34748 (2810)	47066 (7198)	29706 (5669)
Total	59296 (4528)	42659 (4577)	53431 (8201)	31154 (6089)
Size	1.04 (.02)	1.00 (.02)	1.00 (.05)	.96 (.04)
No. of Observations	283	283	55	56

See notes to table 1

Table 12: The Wealth and Debt of Households subject to Unemployment

3.4 Divorced Women, Lone Parents and Family Breakdown

In table 13 we show the circumstances of what is generally believed to be a specific disadvantaged group, divorced women and all households with children headed by women. The most striking aspect of these households is that unlike the other categories discussed, they have negative net financial wealth. There is, however, no evidence that their average debt burden has increased between 1995 and 2000; total debt has fallen substantially.

Data in £2000	2000	1995
Age	35.35 (.65)	33.17 (.64)
Net Income	11658 (592)	10228 (549)
Non-mortgage Debt	771 (168)	841 (170)
Mortgage	10591 (1865)	13357 (1942)
Total Debt	11362 (1919)	14198 (1982)
Net Financial Wealth	-36.75 (291)	-218.96 (255)
Housing Wealth	21964 (4973)	17023 (2840)
Total	21928 (5024)	16804 (2809)
Size	1.08 (.03)	1.02 (.02)
No. of Observations	110	136

See notes to table 1

Table 13: Wealth of Single Women with Children and Divorced Women

A final category we need to consider is that of “new” households created between 1995 and 2000 as a result of family breakdown. The British Household Panel Survey assumes that, when a household breaks up the household of the “reference person” continues with the same household number and that a new household is created with a new reference person; this second household is also included in the survey. Since households consisting of mixed-sex adult couples are usually regraded as headed by a man, it is perfectly possible that a woman leaves one household in which she is not the reference person and moves into another household which is then brought into the survey but where the reference person is again a man.

Table 14 shows the circumstances of all new households classified by the status of the head. In those new households where the head is married or co-habiting, income levels are very similar to those in the population as a whole. The incomes of households with widowed heads are

slightly lower and those with divorced heads are substantially lower than this. People who describe themselves simply as separated have incomes above the population average. Households with married, co-habiting or separated heads have levels of unsecured debt slightly higher than the population average but below 10%; widows have very low levels of unsecured debt while households headed by someone who is divorced have debt levels of over 10% of their incomes on average. The total wealth of households headed by married and separated people is similar to that of the population as a whole even though their average age is lower; for their age they are more wealthy than average. Those new households in which the head is living as a couple have considerably less wealth but their heads are also younger and, taking this into account, it is not obvious that they are disadvantaged wealth-wise. Separated people have not only higher incomes but also more wealth than divorced people; the latter have low wealth for their ages.

	Marrried	Couple	Widowed	Divorced	Seperated
Age	41.68 (2.67)	32.75 (1.58)	70.60 (1.40)	41.48 (1.05)	40.70 (1.68)
Net Income	17813 (2127)	18612 (1344)	16329 (1142)	13328 (902)	20855 (5422)
Non-mortgage Debt	1424 (548)	1426 (403)	91 (69)	1518 (451)	1725 (1071)
Mortgage	23613 (5844)	30014 (5600)	1384 (708)	21210 (3816)	32709 (9434)
Total Debt	25037 (5845)	31440 (5640)	1476 (721)	22728 (3920)	34434 (9860)
Financial Wealth	5423 (3459)	9277 (8622)	26186 (6854)	1635 (1224)	7408 (6783)
Housing Wealth	67622 (30037)	30922 (8191)	106668 (16734)	39395 (7843)	66826 (31720)
Total Wealth	73045 (33090)	40199 (15650)	132854 (19473)	41030 (8098)	74234 (34820)
Size	1.12 (.06)	1.17 (.05)	.73 (.03)	1.02 (.04)	.93 (.06)
Number	31	36	86	64	27

See notes to table 1

Table 14: Wealth and Income in 2000 of Households Created since 1995

One might wonder whether this pattern is different if one looks only at relatively young people forming new households. This is analysed in table 15. The incomes of households headed by widowed and divorced people are substantially lower than would be expected in households headed by people of this age, while those of separated people are high. Unsecured debt levels of households headed by divorced people are high relative to their income even when account is taken of their age. The debts of separated people are also high but this is likely at

least in part to reflect their higher incomes. Levels of total wealth of new households where the reference person is married are particularly low. Nevertheless the numbers of new households and particularly those of new young households are low and this affects the accuracy of the data estimated for them.

	Marrried	Couple	Widowed	Divorced	Seperated
Age	29.73 (1.22)	28.00 (.83)		32.07 (.60)	32.50 (.67)
Net Income	20221 (3927)	18976 (1524)		11911 (1801)	16068 (2478)
Non-mortgage Debt	1708 (966)	1371 (482)		498 (355)	3932 (2908)
Mortgage	36458 (9591)	30778 (7047)		24082 (7133)	32570 (13142)
Total Debt	38166 (9555)	32149 (7061)		24580 (7351)	36502 (15395)
Financial Wealth	907 (2192)	1350 (1299)		2794 (2688)	-3334 (2989)
Housing Wealth	16569 (5434)	21365 (5895)		10312 (3584)	12969 (11739)
Total Wealth	17476 (5857)	22716 (5989)		13105 (5121)	9635 (12958)
Size	1.26 (.08)	1.13 (.04)		1.04 (.05)	0.90 (.09)
Number	15	30		14	10

See notes to table 1

Table 15: Wealth and Income in 2000 of Households Created since 1995: Household Head Aged Under 35

These tables and in particular the comparison between the cross sections of age groups and the movements in the panel as a whole bring out the difference between cross-sections and cohorts. Looking at cohorts of middle-aged and old workers there is a tendency to pay down mortgage debt as time passes, while when looking at the cross-section debt has increased over time with the implication that the new young are tending to borrow more than the old young.

The data indicate that in general people with low incomes have lower debts both in absolute terms and as a proportion of their incomes. Thus non-mortgage debt, at least as identified in the British Household Panel Survey is something of a luxury item accrued by households who can afford to service it, a conclusion also reached by Del-Rio & Young (2003). There is little general evidence that household breakdown leads to high debts, although levels of debt are high in households headed by people who had split from the households in which they lived in 1995 and who were also divorced in 2000. However the financial circumstances of households headed by women and with children present or divorced women with or without children are very

different from those of almost every other group. Although they do not have large unsecured debts relative to their incomes, they have negative net financial worth; the only other category we have identified in this position are households which do not own their own homes and whose heads are aged 20-34.

3.5 A Summary of the Wealth Data

Finally we present in table 16 a summary of the data. This table presents ratios derived from the earlier tables for the ratios of non-mortgage debt and total wealth to income. A number of interesting points emerge from this. First of all, the increase in the ratio of average debt to average income is greater for the age groups 20-34 and 35-50 than for the economy as a whole. This suggests that the increase in indebtedness is in part a cohort effect; People aged 20-34 borrowed more in 2000 than they did in 1995 and the increase was larger than the increase in borrowing by people who had been aged 20-34 in 1995 (and were aged 25-40 in 2000). People who do not own their own homes tend to have an unsecured debt to income ratio slightly higher than that of home-owners. But perhaps the surprise is that the difference is so small, given that home-owners with equity in their houses are able to use this as collateral and are likely to have a strong preference for secured rather than unsecured debt at least for borrowing intended to last any length of time.

Nor is it obvious that households who have experienced difficult circumstances tend to have high average levels of debt compared to their incomes. Given the average age of the household heads, debt-income ratios are high for households with unemployed heads in 2000. But it must be remembered that these households tend to have incomes which in many cases may be low relative to permanent incomes, boosting the debt/income ratios. The debt levels of households headed by divorced women or single women with children are not high relative to their incomes; nor is it obvious that the debt levels in “new” households created by family break-up are large relative to incomes; there is a high ratio of debts equal to nearly 25% of income for new households headed by separated people aged under 35, but it must be remembered that there are very few of these in the sample.

The figures for total wealth show the life-cycle effect clearly. People’s wealth rises during their working life; after retirement income falls more rapidly than wealth, at least initially so the ratio is further increased. There is a stark, but not very surprising distinction between those who own their houses and those who do not. The former have an average amount of wealth which rises to a substantial multiple of their income in middle age and even further as their income declines in retirement. The latter own wealth equal to less than one year’s income even after they have reached the retirement age.

In 1995 the average household with a head under 50 which did not own a house was a net debtor. By 2000 only those with heads aged under 35 were net debtors. In part this reduced level of debt is associated with the reported mortgage debt of non home-owners in 1995 on which we have commented earlier. Nevertheless, taking these figures at their face value, they do not give the impression of a worsening financial position even for this group. The increase in borrowing combined with the increase in net worth of these non-house owners suggests that some members of the group have increased their borrowing while others have increased their savings. For obvious reasons people tend not to own substantial financial assets at the same time as having unsecured debts.

Looking at the subgroup of people who report non-zero unsecured debt, we can see that the ratio of debt to income has increased for all age groups, with the increase being more marked among young and middle-aged households than among those headed by old and older people. The ratio of wealth to income has nevertheless increased although, for people aged 50-64, not by very much.

The broad impression one gains from these data is that, although the average amount of unsecured debt outstanding did increase faster than income between 1995 and 2000, it is difficult to identify a category of household for which the increase in debt was particularly pronounced. Nevertheless by 2000 those households with heads under 50 with unsecured debt did have average levels approaching 20% of average income. Since these figures are calculated from averages, one can imagine that there are some households facing substantial strain as a result of their debts. The fact that unsecured debts are usually of short maturity is likely substantially to increase the burden that these households face.

	Ratio of Non-mortgage Debt to Income		Ratio of Total Wealth to Income		Average Age	
	2000	1995	2000	1995	2000	1995
All Households	6.5%	5.9%	398.1%	298.0%	54.0	49.0
Aged 20-34	11.3%	9.3%	124.6%	66.7%	29.9	28.7
Aged 35-50	10.2%	7.7%	270.4%	210.0%	41.6	41.7
Aged 50-64	4.1%	3.8%	459.0%	436.3%	56.5	56.5
Aged 65+	1.1%	0.8%	664.7%	589.1%	75.3	72.8
House-owners						
Aged 20-34	10.8%	8.7%	172.2%	94.5%	30.4	29.4
Aged 35-50	9.9%	7.7%	311.7%	242.5%	41.7	41.7
Aged 50-64	4.1%	3.3%	526.6%	501.9%	56.4	56.4
Aged 65+	1.3%	1.0%	882.6%	777.1%	74.3	71.9
Non house-owners						
Aged 20-34	11.9%	11.0%	-6.1%	-14.9%	29.2	27.8
Aged 35-50	11.8%	7.5%	8.5%	-3.7%	41.5	41.9
Aged 50-64	4.4%	7.0%	18.6%	6.0%	56.8	56.8
Aged 65+	0.6%	0.4%	70.3%	60.4%	76.9	74.1
Households with unsecured debt						
Aged 20-34	18.0%	15.0%	94.9%	49.7%	29.9	28.6
Aged 35-50	19.9%	15.8%	205.9%	150.4%	41.3	41.4
Aged 50-64	13.5%	13.0%	358.5%	353.8%	55.8	55.4
Aged 65+	12.2%	8.9%	619.2%	502.7%	71.3	70.0
Households in Poverty in 2000	10.6%	9.3%	595.7%	294.9%	44.2	41.8
Households in Poverty in 1995	9.9%	11.1%	229.9%	312.4%	42.1	40.2
Households where Head unemployed						
In 1995		5.3%		205.6%		42.5
In 2000	12.3%		240.1%		51.9	
In any year 1995-2000	9.7%	6.1%	318.1%	206.6%	51.4	46.0
Divorced or Single Women with Children	6.6%	8.2%	188.1%	164.3%	35.3	33.2
Households created by family breakdown between 1995 and 2000						
Married	8.0%		410.1%		41.7	
Co-habiting	7.7%		216.0%		32.8	
Widowed	0.6%		813.6%		70.6	
Divorced	11.4%		307.8%		41.5	
Separated	8.3%		356.0%		40.7	
Households with head under 35 created by family breakdown						
Married	8.4%		86.4%		29.7	
Co-habiting	7.2%		119.7%		28.0	
Widowed						
Divorced	4.2%		110.0%		32.1	
Separated	24.5%		60.0%		32.5	

Table 16: Debt and Wealth Ratios

4 The Life-Cycle Model and its Implications

We have above provided a description of the data. In order to understand them more fully it is necessary to have a conceptual framework. We adopt that provided by the life-cycle model of consumption and saving. The basic assumption of this approach is that people have discretion about how much they spend on goods and services at each point in their lives. They are assumed to be able to borrow or to run down their savings in periods when income is below desired consumption, and to add to their savings when the opposite is true. Thus consumption is not constrained by income in any period. On the other hand over the total life cycle total consumption cannot exceed total resources; analysis is simplified if one assumes that people do not choose to leave legacies. Thus, over the life cycle total income is constrained to equal total expenditure.

The calculation of total income has to take into account interest paid on debt or earned on savings. In an environment of certainty where the real interest rate is constant, the simple life-cycle model implies that consumption will grow at a constant rate; in applying it we have assumed that households plan for their consumption to grow steadily up to the age of 65 and to remain constant in real terms on a *per capita* basis after that. In the presence of uncertainty the assumption of a constant growth rate is only an approximation³ but we follow Kapteyn et al. (forthcoming) in taking it as our reference framework. We describe the basic model in more detail in the appendix and show there how we can use it to derive an expression for the change in household net asset holding over time. The current level of net asset holding is a consequence of history but is influenced by expectations of future income and income growth. Favourable expectations of future income growth provide a reason for not holding assets and/or for borrowing at the present. The change in asset holding from one period to another depends on both expectations of future changes to household income and the extent to which past expectations have been disappointed.

This offers a fairly general means of exploring whether asset and debt holding are linked to expectations of future income growth and we do this in two ways. We first look at a regression equation in which future income growth is one of the determinants of current levels of asset/debt holding. Since the British Household Panel Survey provides data for both 1995 and 2000 we can investigate whether the influence of future income change is similar in both years, as a means of exploring the stability and therefore the plausibility of any effects which are identified. The

³It is now possible to simulate the behaviour of optimising consumers facing uncertainty. However, the nature of the calculations involved means it has not yet proven possible to fit such models to rich data sets. Thus Gourinchas & Parker (2002) fit their model only to the mean levels of consumption by age and do not attempt to investigate what would cover the cross-section of household consumption.

drawback of this approach is that, since the survey does not at present provide data beyond 2002, it is not possible, without giving some structure to expected future income movements to examine how far the influence of expected income is coherent with the framework set out here. It does, however, allow us to explore the influence of short-term income movements on debt and asset holding.

Our second approach uses econometric estimation of income dynamics in order to provide forecasts of future income - with the drawback that our analysis is no better than the model used to project forward future income- but with the advantage that it allows us to produce a predicted value for the change in asset holding between 1995 and 2000, and therefore to compare this with the actual change in asset/debt positions.

5 The Influence of Short-term Income Movements on Debt

In this section we use a regression model to explore whether and how far debt and asset positions of households are related to future short-term income movements. We do this for the households which reported non-zero holdings of the relevant type of asset/liability in 1995 and 2000. There is obviously a risk that these households may not be representative of the population as a whole. We allow for this by fitting probit models to explain whether a household drawn into the initial sample with usable data in 1991 had non-zero debt/asset holdings in 1995 and 2000. These models are estimated on the 1991 data for the whole sample providing the required data. Following Heckman (1979) we then use the probabilities for non-zero asset holdings calculated using the probit equations as explanatory variables in the regressions, exploiting the original variables used in the probit equations as instruments in these regressions. A statistically significant coefficient on the probability of inclusion indicates that the subgroup studied is not representative of the whole population; at the same time the inclusion of the extra variable corrects for the bias which would otherwise result.

In carrying out the regressions we can include the change in income in years after 1995 in the regression for 1995 and similarly the change in income in years after 2000 in the regression for 2000. Since there are only two years of post-2000 income data we use income data only for 1996 and 1997 in the 1995 regression. This puts the two regressions on the same footing and allows us to explore whether there are systematic differences between the two. However, income in 1996 and 1997 or 2001 and 2002 is unknown at the time people are making decisions which result in their debt/asset positions in 1995 and 2000. Following Goldberger (1972) we address this using instrumental variables; to be valid the instruments have to be drawn from

the set of information which was known to the households when making the decisions resulting in their 1995 and 2000 debt/asset positions respectively.

We apply our analysis to three variables, unsecured household debt, all household debt including mortgages and all household assets including housing and reported financial assets⁴, measuring each as a multiple of household income in the previous year. We fit a general regression of the form

$$\begin{aligned}
 y_{iT} = & \alpha_{1T} \log Inc_{iT} + \alpha_{2T}(\Delta \log Inc_{iT+1} + \Delta \log Inc_{iT+2}) + \alpha_{3T} \Delta \log Inc_{iT+2} + \textit{Demographic Terms} \\
 & + \beta_{1T} \textit{Home-owner} + \beta_{2T} \textit{Breakdown}_{iT} + \beta_{3T} \textit{Poverty}_{iT} + \beta_{4T} \textit{Home-owner}_{iT} \times \log Inc_{iT} \\
 & + \beta_{5T} \textit{Age}_{iT} \times \log Inc_{iT} + \beta_{6T} \textit{Age}_{iT} \times \textit{Home-owner}_{iT} + \beta_{7T} \textit{Prob in sub-sample} + \beta_{8T}
 \end{aligned}$$

where y_{iT} is the ratio of debt or asset holding to income in year T , (1995 or 2000) $\Delta \log Inc_{T+1}$ is the change in real income adjusted for household size in year $T + 1$, the demographic terms include age, age², sex, ethnic group, marital status, graduate/non-graduate, family size and numbers of children in different age groups. We also include dummies for home ownership, recent family breakdown, indicated by a household whose head had reported being married or living in a couple in year $T - 1$ and was now no longer doing so, poverty (defined by an income adjusted for family size of less than 60% of median adjusted income) and multiplicative terms allowing for the interaction of home ownership, log income and age. This selection of dummies is intended to address the fact that the wealth and debt of home-owners is likely to be very different from that of non home-owners and difference may depend on income levels and not simply on whether a house is owned or not. The specification above allows us to test the restriction that the effect of income growth is the same in years $T + 1$ and $T + 2$; this would be reflected in a significant coefficient for α_{2T} and an insignificant coefficient for α_{3T} .

It is of course possible, indeed likely that, even if we look at debt/assets as a multiple of income, low debt households in 1995 are also low debt households in 2000; the components of debt not explained by the regressions may be correlated. We can explore this using three-stage least squares in order to take account of this possible correlation.

There is, however, one change which is needed as compared to conventional three-stage least squares. In our model data for 2000 and all years earlier are valid instruments for the income change in 2001 and 2002; they are not valid instruments for income change in 1996 and 1997. Standard three-stage least squares applies all the instruments to all the exogenous variables and would therefore use post-1995 data to “explain” expectations of income growth in 1996 and 1997 held in 1995. We avoid this problem by restricting the first stage of the three-stage least squares, so that only data for 1995 and earlier are used to provide instruments for income

⁴These do not normally include occupational pension rights.

growth in 1996 and 1997. We use income data for the period 1991-1995 as instruments for income growth in 1996 and 1997; for 2000 and 2001 we use income data for the period 1996-2000. We also include in both cases the 1991 variables used in the sample selection equation discussed above.

The probit equations which determine the chance that any household had non-zero unsecured debt, total debt or total wealth are shown in table 17. The table shows the chance, from the initial population of 2711 households the coefficients in probit equations to explain the chance that any one of the initial households provides a full usable record with data on income and wealth for the whole period 1991-2002 and also that it has a non-zero holding of unsecured debt, total debt or assets (financial and housing) in 1995. The z -values are the ratios of the coefficients to the standard deviations and provide a guide as to the statistical significance of the variables. It is clear that the dominant influences are age, age² and, except for unsecured debt, log income in 1991. We can calculate the age at which non-zero holdings are most likely; this is found by dividing the coefficient on age by minus twice the coefficient on age² and is thirty-three for unsecured debt, thirty-five for total debt and thirty-seven for total wealth. However since the observations on these variables relate to 1995, four years can be added to each. We also note that, while the chance of holding unsecured debt is not very sensitive to domestic status (except that it is lower for people who are widowed or separated—we have not been able to distinguish these), the chance of both total debt and non-zero total wealth is higher for households headed by people who are married or co-habiting than for households headed by people who are divorced or single. For given levels of income etc. people with “other” educational qualifications are more likely than other people to have both assets and liabilities.

We present the regressions themselves in tables 18, 19 and 20 both in initial unrestricted form and after imposing restrictions on the coefficients. We have imposed a 3% upper trim on the data before estimating the equations for unsecured debt (which cannot be negative) and 3% upper and lower trims on the data for the equations for net assets. This presents the results being distorted by a few outlying observations.

We have imposed restrictions in two stages. First of all we have suppressed very insignificant coefficients. The test statistics for the validity of these restrictions are shown under the unrestricted coefficients for 1995 and it is clear that all restrictions are easily accepted.

For the remaining variables we have tested, pair by pair, the cross-equation restrictions that the coefficients take the same values in 1995 and in 2000. For the two debt regressions we have then imposed the restrictions jointly; these are readily accepted as the χ^2 statistics under the 1995 restricted coefficients show. For the equations for total assets we found that the

Values in 1991	Unsecured Debt		Total Debt		Total Wealth	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
Sex (Female=0, Male=1)	0.059	0.77	0.018	0.26	0.094	1.36
Age	0.150	5.46	0.244	9.22	0.269	11.06
Age ²	-0.002	-6.67	-0.003	-10.55	-0.004	-12.42
Married	0.492	1.80	0.707	2.91	0.508	2.50
Co-habiting	0.571	1.95	0.683	2.59	0.470	2.06
Divorced	0.430	1.53	0.318	1.26	0.166	0.78
Single	0.384	1.34	0.480	1.88	0.306	1.40
Higher Degree	-0.078	-0.34	0.015	0.07	0.328	1.52
First Degree	-0.022	-0.21	0.130	1.31	0.139	1.41
A-levels	0.052	0.51	-0.024	-0.25	0.085	0.91
O-levels	-0.077	-0.92	-0.032	-0.41	-0.032	-0.43
Nursing	0.282	1.00	0.425	1.58	0.466	1.77
Other qualification	0.665	1.46	1.031	2.20	0.826	1.78
Log {Income /Household Size}	0.051	0.79	0.239	3.95	0.209	3.59
Children 0-2	0.169	1.42	0.081	0.72	-0.025	-0.23
Children 3-4	-0.021	-0.14	0.122	0.83	0.221	1.53
Children 5-11	-0.315	-2.02	-0.224	-1.52	-0.128	-0.89
Children 12-15	-0.162	-1.26	-0.154	-1.26	-0.097	-0.80
Children 16-18	-0.222	-1.64	-0.206	-1.61	-0.168	-1.33
Constant	-3.687	-5.88	-6.012	-9.94	-6.134	-10.95
χ^2_{19}		429.76		829.04		928.04
Prob >		0		0		0
Pseudo R^2		0.1719		0.2538		0.266
Log likelihood		-1035.4		-1218.64		-1280.55
No of Observations		2711				

The dependent variable takes 1 if the household has the relevant liability/asset in both 1995 and 2000 and zero if it does not or if there are no data. The sample is all households which provide the data for the explanatory variables indicated in 1991.

Table 17: Probit Equations to Explain Whether Households Reported Debt and Asset Holding in 1995 and 2000

overall test was rejected unless we abandoned the restriction that the age terms had the same coefficients in both years. Having relaxed this restriction we then imposed the others with the χ^2 statistic shown. The restricted coefficients are indicated in the table by having the same values in 1995 and in 2000.

We find that expected future income growth influences both unsecured and total borrowing. We are able to accept the restriction that the influences of expected income growth one year ahead and two years ahead are equal. Someone who expects their income to rise by 50% over the coming two years would take additional unsecured debt of 5.8% of current income and total debt of 28% of current income compared to someone who does not expect any increase in debt. This extra borrowing, assumed to be spent immediately, is not large if the increase in income is

expected to be reasonably durable. We find that households headed by men tend to have more unsecured debt; the effect was not significant in the equation for total debt, but since it was present in the unrestricted equation and of similar magnitude to that for unsecured debt, it would be a mistake to infer that households headed by women necessarily have more mortgage debt.

The effects of age in the equation for unsecured debt are of interest. There is a positive term on age, but a negative term on the interaction of age and income; this implies that the debts of people with low incomes rise faster than those of people with high incomes. The debt-income ratio is decreasing in family size, but over and above this, it tends to be enhanced by the presence of children aged 3-4. The impact of children aged 5-11 differed in the two years, so no generalisation is possible. We can also see that households in poverty tend to have larger debts than other households; however, at 3.9% of income the effect is, however not very large.

The sample of people in the regression for total debt is considerably larger; there are many households with mortgages but no other borrowing. We have already noted that expected future income growth is a significant determinant of total debt as well as of unsecured debt. We also see that people who are widowed have unusually low debts after controlling for age and other variables. This may reflect the fact that many substantial debts often have life insurance associated with them, so that they may be at least partially repaid when people become widowed. Other things being equal graduates tend to borrow more than non-graduates. This may reflect some long-term effect of earnings expectations in addition to the short-term effect noted above.

That home-owners have higher debts than non-home owners is not very surprising. However the coefficient of 1.486 needs to be interpreted in conjunction with the interactive terms also identified. Home-owners debts as a proportion of their income tend to reduce with their incomes but to increase as a function of their age. On the other hand age interacts with income in a manner which tends to depress debt levels, and particularly those of people on high incomes. And it must be remembered that these results also depend on the probability of households having debt. The equations we have estimated for this show that this probability declines with age.

We find that the ratio of debt to income declines with family size; people with large families find debt difficult to manage relative to their incomes. However families with young children tend to have high levels of debt relative to their income. In other words the effect of family size is not properly represented by the McClements scale. A likely explanation for this is that families with young children are likely to have particularly low incomes as a result of one spouse providing child-care. Poverty is not a significant influence on the ratio of total debt to income,

with the implication that people in poverty have to rely more on unsecured debt and less on mortgages as a way of meeting their credit needs. However recent family breakdown, with a coefficient of 0.422 income, has a fairly marked but not statistically significant impact on debt ratios. We have left the term in the equation because it does point to an extra debt burden arising from family break down. The term may be poorly determined because only a small number of families experience breakdown in any year and thus the overall sample is too small to determine the size of this with any degree of precision.

The picture of total wealth measured as a proportion of income is rather more confused. We expected and observed expected future changes to income to have a positive influence on debt holdings. For the same reason one would anticipate a negative influence of expected future income change on holdings of wealth. The unrestricted regression gives a balance which suggests a positive influence but it is not statistically significant and is suppressed in the restricted model. Wealth holdings increase with the square of age, and the effect is much more marked in 2000 than in 1995. This no doubt reflects the impact of the stock market boom of the late 1990s. The primary beneficiaries of this were people who already owned shares, and the impact of age was thereby enhanced. We also observe a positive dummy for home ownership; this was larger in 2000 than in 1995 reflecting the increased value of houses; there is also an interaction between age and house ownership indicating that old and older home owners tended to have particularly high ratios of wealth to income.

The link between age and income as determinants of the wealth income ratio needs some explanation. In 1995 there was a negative coefficient on log income and a small additional negative coefficient on the product of age and log income. In 2000 the coefficient on income alone was positive but the coefficient on age multiplied by income was much more negative. For any household with a head aged forty-seven or older the income gradient was more steeply negative in 2000 than in 1995. This coefficient reflects the fact that old and older people with low incomes are particularly likely to have high wealth/income ratios. Young households are less affected because they have had less opportunity for building up wealth in the first place.

Households headed by people with degrees tend to have high wealth/income ratios. This may reflect the fact that they are more able to borrow to buy houses (as noted above) and have benefited from capital gains in the housing market. High family size depresses the wealth income ratio with a coefficient very close to one; however there are positive terms for numbers of children suggesting once again that the McClement's scale is not a complete representation of the effects of household size on capital accumulation. The failure to find any effect for the number of children aged 3 to 4 we regard as a consequence of the sample structure; we also note that the impact of the number of children aged 12-15 differed markedly in the two years.

These observations suggest some general conclusions. First of all, expectations of future income change appear to influence borrowing behaviour. The negative influence on total wealth holding which might be expected is not present, perhaps because the influence of share and house prices on wealth accrual mean that the process is much more haphazard than is borrowing. Poverty is a positive influence on unsecured borrowing and households with male heads tend to have more unsecured borrowing than do households with female heads. Given that people have debts their debts are likely to increase with age. Family break-down is a close to significant cause of a high ratio of total debt to total income. For all except the poorest people total debts relative to income decrease with age.

Thus this analysis summarises a number of interactions between poverty and debt. People on low incomes throughout their lives seem to have been subject, on average to a tendency for debt to cumulate and this can be enhanced by recent family breakdown. Accrual of wealth is strongly interrelated with home ownership and people who do not own houses tend to have markedly less wealth than those who do. A natural conclusion from this finding is that people who cannot make it onto the housing ladder are deprived the opportunity for subsequent wealth accumulation. However an alternative conclusion is also possible. Benefit structures are likely to mean that it is not sensible for poor people to save and, for the same reason not buying a house may be a rational decision. However analysis of this question is outside the scope of this project.

	Unrestricted				Restricted			
	1995		2000		1995		2000	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
Log Income	-0.004	-0.04	0.304	0.66				
Income Growth $_{+1and+2}$	0.215	2.05	0.472	0.61	0.117	2.22	0.117	2.22
Income Growth $_{+2}$	-0.105	-0.46	-1.336	-0.73				
Age ²	0.000	-0.21	-0.001	-0.71				
Sex (Female=0, Male=1)	0.055	2.21	0.093	1.86	0.059	3.26	0.059	3.26
Age	0.008	0.42	0.069	0.82	0.009	2.66	0.009	2.66
Race (Non-white=0, White=1)	-0.007	-0.12	-0.296	-0.86				
Married	0.029	0.74	-0.166	-0.69				
Co-habiting	0.000	0.01	-0.190	-0.60				
Divorced	0.032	0.70	-0.023	-0.15				
Widowed	0.035	0.31	-0.387	-0.69				
Degree	0.011	0.42	0.008	0.11				
Family Size	-0.109	-2.47	-0.032	-0.31	-0.110	-4.43	-0.110	-4.43
Home owner	-0.001	-0.05	0.025	0.43				
Children 0-2	0.013	0.51	-0.116	-0.69				
Children 3-4	0.034	1.25	0.066	0.91	0.041	1.87	0.041	1.87
Children 5-11	-0.027	-1.96	0.038	0.57	-0.024	-2.11	0.021	0.92
Children 12-15	-0.003	-0.13	-0.045	-0.89				
Children 16-17	-0.010	-0.18	0.058	0.54				
Recent Family Breakdown	-0.042	-0.30	-0.365	-0.67				
Poverty	0.052	2.28	-0.070	-0.65	0.039	1.96	0.039	1.96
Home owner \times Log Income	-0.020	-1.12	-0.037	-0.70				
Age \times Log Income	-0.001	-0.23	-0.007	-0.78	-0.001	-2.00	-0.001	-2.00
Age \times Home owner	0.002	1.00	0.005	0.79				
Probability in Sample	0.507	1.16	-0.265	-0.23	0.656	2.80	0.656	2.80
Constant	0.006	0.01	-1.607	-0.63	-0.038	-0.42	-0.055	-0.54
R^2	0.170		0.019		0.1684		0.071	
Standard Error	0.13		0.30		0.13		0.15	
χ^2	7.39	32			6.03	9		
No of Observations	276							

The equations are estimated by 3-stage least squares. Log real income data adjusted for household size in the period 1991-1995 are used as instruments for growth in real income adjusted for household size in 1996 and 1997. Similar data for 1996-2000 are used as instruments for income growth in 2001 and 2002. The variables listed in table 17 and used to explain the probability of holding unsecured debt are used as instruments for this probability in both years

Table 18: Determinants of Unsecured Debt as a Proportion of Income

	Unrestricted				Restricted			
	1995		2000		1995		2000	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
Log Income	-0.280	-0.50	0.065	0.11				
Income Growth _{+1and+2}	0.548	1.07	0.500	0.38	0.567	2.89	0.567	2.89
Income Growth ₊₂	0.142	0.16	-0.158	-0.06				
Age ²	0.000	0.35	0.000	0.39				
Sex (Female=0, Male=1)	0.102	0.88	0.056	0.38				
Age	-0.039	-0.44	-0.026	-0.26				
Race (Non-white=0, White=1)	-0.064	-0.28	0.141	0.66				
Married	0.010	0.05	-0.004	-0.02				
Co-habiting	0.193	0.92	0.147	0.57				
Divorced	-0.088	-0.41	0.018	0.09				
Widowed	-0.893	-1.39	-1.163	-2.18	-1.244	-2.94	-1.244	-2.94
Degree	0.179	1.44	0.241	1.69	0.222	2.50	0.222	2.50
Family Size	-0.699	-3.64	-0.748	-4.60	-0.637	-6.99	-0.637	-6.99
Home owner	1.337	8.83	1.611	12.16	1.486	14.02	1.486	14.02
Children 0-2	0.065	0.51	0.241	1.47	0.148	1.61	0.148	1.61
Children 3-4	0.118	0.95	0.242	1.83	0.186	2.25	0.186	2.25
Children 5-11	-0.064	-0.87	0.117	1.28	-0.038	-0.77	0.080	1.41
Children 12-15	0.068	0.65	0.047	0.54				
Children 16-17	-0.380	-1.40	0.299	1.85				
Recent Family Breakdown	-0.190	-0.24	0.497	0.65	0.422	1.60	0.422	1.60
Poverty	-0.028	-0.28	-0.042	-0.31				
Home owner × Log Income	-0.092	-1.24	-0.115	-0.74	-0.145	-2.82	-0.145	-2.82
Age × Log Income	0.000	0.02	-0.009	-0.77	-0.004	-3.62	-0.007	-6.59
Age × Home owner	0.006	0.66	0.013	0.74	0.015	2.35	0.015	2.35
Probability in Sample	1.867	2.51	0.710	0.79	1.355	3.77	0.761	2.23
Constant	3.053	1.05	2.516	0.69	1.438	4.52	2.266	6.77
R^2	0.2507		0.2798		0.2422		0.2553	
Standard Error	0.98		0.93		0.99		0.95	
χ^2	13.52	24			12.76	15		
No. of observations	627							

See notes to table 18

Table 19: Determinants of Total Debt as a Proportion of Income

	Unrestricted				Restricted			
	1995		2000		1995		2000	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
Log Income	-1.132	-1.58	4.304	2.70	-1.200	-2.15	1.967	2.05
Income Growth $_{+1and+2}$	-0.198	-0.22	1.860	0.77				
Income Growth $_{+2}$	1.515	0.96	3.268	0.91				
Age ²	0.005	2.66	0.006	2.10	0.002	2.58	0.006	5.32
Sex (Female=0, Male=1)	0.003	0.01	0.429	1.56				
Age	-0.225	-1.45	0.199	0.70				
Race (Non-white=0, White=1)	0.352	0.89	0.135	0.22				
Married	-0.739	-2.43	-0.944	-1.98	-0.483	-2.22	-0.483	-2.22
Co-habiting	-0.715	-2.05	-0.066	-0.11	-0.298	-1.07	-0.298	-1.07
Divorced	0.045	0.13	-0.124	-0.23				
Widowed	1.202	1.82	1.605	1.61	1.171	1.87	2.670	2.97
Degree	0.608	2.90	0.224	0.64	0.706	3.65	0.706	3.65
Family Size	-0.725	-2.56	-1.618	-3.18	-0.959	-4.15	-0.959	-4.15
Home owner	2.147	9.26	2.765	6.79	2.187	9.92	2.827	7.96
Children 0-2	0.266	1.23	0.978	1.87	0.343	1.89	0.343	1.89
Children 3-4	0.083	0.38	0.652	1.53				
Children 5-11	0.354	2.94	0.547	2.25	0.261	2.77	0.261	2.77
Children 12-15	0.197	1.23	0.939	3.91	0.188	1.47	0.586	2.76
Children 16-17	0.243	0.60	0.266	0.64				
Recent Family Breakdown	-0.557	-0.29	1.844	1.30				
Poverty	-0.050	-0.31	0.024	0.08				
Home owner \times Log Income	-0.072	-0.58	-0.081	-0.36				
Age \times Log Income	-0.008	-0.48	-0.108	-3.95	-0.013	-0.98	-0.080	-4.01
Age \times Home owner	0.017	1.14	0.018	0.74	0.009	3.17	0.009	3.17
Probability in Sample	1.946	1.90	2.908	1.68	1.095	1.58	4.443	4.71
Constant	8.820	2.12	-17.092	-1.73	6.054	3.35	-4.554	-1.53
R^2	0.294		0.2155		0.2958		0.2799	
Standard Error	1.91		2.93		1.91		2.69	
χ^2	20.39	22			9.80	8	0	
No. of observations	791							

See notes to table 20

Table 20: Determinants of Total Wealth as a Proportion of Income

6 Non-property Income Forecasts

Our second way of investigating the role of expected future income as an influence on debt and asset holding relies on producing forecasts of household income. We capitalise these as described in section 4 and appendix 9. Making the assumption that households work to a maximum life span of eighty-five (for the head of the household) and taking account of initial assets/debts we are able to calculate how assets/debt changes from one period to the next in the light both of income evolving as expected and as a consequence of revisions to expectations following shocks (unexpected events). The approach we follow is similar to that set out by Kapteyn et al. (forthcoming). Given a panel household income data, we can see how incomes after adjustment for household size have changed from one period to the next, and attempt to explain this in terms of economic variables.

The most obvious model of income change is the assumption that future changes in income depend on the current level of income. A negative coefficient on the current level of income implies some form of mean reversion. If this is found it implies that people whose incomes are unusually low should expect to see faster than average growth, with the opposite being true of those whose incomes are unusually high. There are, however, a variety of other factors which are likely to affect income and income growth. One is age of the household head. It is generally observed that household incomes is "hump-shaped" with the peak reached when the household head is aged around 45, although this hump is less pronounced when income per effective member rather than total household income is studied. Education is obviously likely to affect earnings and so to may family circumstances. Income per effective person is likely to be lower in households with children, and particularly those with young children than in households without children. But single people working full time are widely observed to earn less than married people working full time, and the equivalence scale enhances this effect because it implies that there are economies of scale to living as a couple.

One might expect that the selectivity question noted in section 5 would also appear here. There are 987 households which provide usable income and wealth data and there is a question whether they are representative of the whole group of 2711 households with some income and demographic data in the initial survey. However, unlike Kapteyn et al. (forthcoming) we wish to estimate a dynamic forecasting model for future income, in which the expected future level of income depends on current and past income levels and not simply on exogenous variables such as age. This means that we have to use the approach developed by Arellano & Bond (1991) to deal with the bias which would otherwise arise from the presence of the dynamic terms (Nickell 1982). This technique involves the use of the Generalised Method of Moments

to estimate an equation differenced over the time dimension of the panel; differencing removes the term which would otherwise be needed to address the question of selectivity bias.

We face the problem that we wish to project income for the whole of a household's life-span; to the extent that future income depends on other variables as well as past income it is necessary to forecast these variables as well as income; such an approach would be standard in a conventional VAR model. However the estimation of conventional VARs inevitably requires many more observations than the twelve available to us from the British Household Panel Survey. Instead we adopt the solution of constructing h -step ahead forecasting equations and we develop a means of forecasting ahead from these (Bhansali 2002, Marcellino et al. 2004). In fact, because of the relatively small time dimension of our data set, we use multi-step forecasting equations to predict income growth up to three periods ahead. We then look at the relation of income in the fourth ahead to income predicted in the third period ahead and use this relationship to roll forward income to retirement. Beyond the age of sixty-five we assume that income is constant in real terms.

There has been substantial discussion about whether and how far incomes tend to converge to the mean over time. Blundell & Preston (1998) observe that income data are short-term noisy (or measured with error), with the implication that there may be rapid short-term convergence, with longer-term convergence possibly proceeding at a much slower pace. Our multi-step approach addresses this because it allows for short-term noise to die away rapidly and can then show slower long-term convergence.

We measure incomes, adjusted for household size, relative to a smoothed profile of income as a function of age. We calculate the latter by first of all converting the income data adjusted for household size to 2000 prices, by means of the consumption deflator in the national accounts. We then calculate the average income as a function of age year by year. Since the data cover the period from 1991 to 2002 these data can be regarded as centred on a point midway between the 1996 and 1997 surveys. We evaluated the average of these incomes in five-year bands (20-24, 25-29 etc.) and allocate these averages to the mid-years of the bands (22,27 etc.). We then fit a cubic spline through these averages and interpolate the variable for each individual year. The results of this are shown in figure 1.

This income profile points to income rising fairly sharply between the ages of 21 and 30. There is then a dip, probably associated with child-birth and associated reduced household labour supply. A new peak is established in the mid-forties and income then falls away as people age. There is a fairly sharp fall between the ages of fifty-seven and sixty-five as households gradually withdraw from the labour market. Beyond the age of sixty-five income appears to be stable until the late seventies when a further decline appears. There are relatively few people

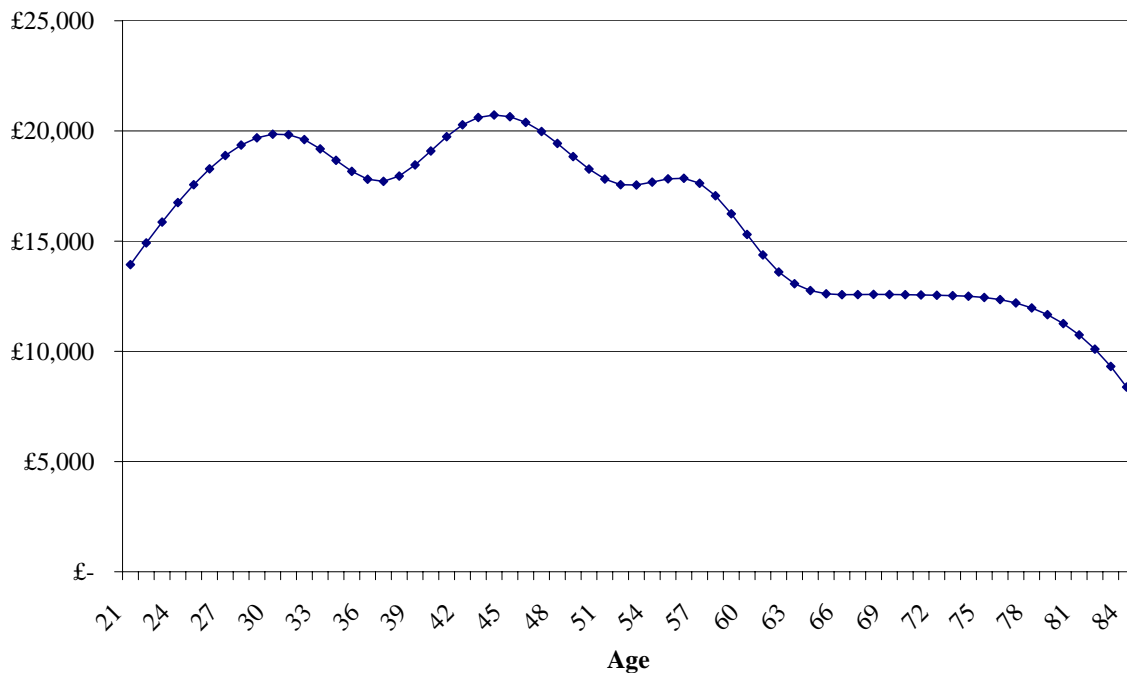


Figure 1: The Income Profile Generated by the Cubic Spline

in their late seventies and eighties in the survey, so it is not clear how precise this part of the curve is. On the other hand it is well-known that pensioner poverty is particularly acute among very old pensioners. We find that, for our purposes, analysing the borrowing needs of people of working age, it makes very little difference whether one assumes that real incomes of people over sixty-five are constant as they age or whether the pattern shown in the profile is accurate.

There is a separate question whether there are substantial cohort effects present, as Banks et al. (2000) suggest. With the limited time dimension available it is difficult to identify specific cohort effects and we assume income expectations are driven by an assumption that there is a process of gradual convergence towards the incomes shown by the profile in figure 1, adjusted for the trend rate of growth of income from non-investment sources. Over the period of the survey this is 2.5% p.a.; we can, however, experiment with the implications of slower rates of assumed trend growth and we make our projections using an assumed growth rate of 2% p.a.

The model of income dynamics we adopt is to measure income net of investment income and adjusted for household size relative to the spline value shown in figure 1. We assume that the logarithm of the ratio is related to its lagged values and also to demographic circumstances such as marital status and number of children. We estimate three equations. The first forecasts

income (the log of the deviation from the profile value) in period t as a function of its value in period $t - 1$ and in earlier years. The second forecasts it on the basis of information known at period $t - 2$ and the third on the basis of what is known in period $t - 3$. We then forecast income in period $t - 1$ using the $t - 3$ equation but with a one period lag, i.e. on the basis of what is known in period $t - 4$, and explore how this performs as a means of forecasting income in period t . As noted above, we have estimated the equations using the method suggested by Arellano & Bond (1991), involving the method of moments applied to differenced equations. This means that the effects of trend growth in incomes relative to the spline is taken up as the constant term each regression. Our equations, after restriction of insignificant terms to zero are shown in table 21. Once again, for reasons of convenience we show only the z-statistics and not also the standard errors of the coefficients.

	1-step ahead		2 steps ahead		3 steps ahead		Based on 3-step forecast	
	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat	Coef.	z-stat
$\Delta \log\{FcstInc/ProfileValue\}_{t-1}$							1.097	5.76
$\Delta \log\{FcstInc/ProfileValue\}_{t-2}$							-0.017	-0.203
$\Delta \log\{Inc/ProfileValue\}_{t-1}$	0.471	3.26						
$\Delta \log\{Inc/ProfileValue\}_{t-2}$	0.109	1.34	0.298	1.81				
$\Delta \log\{Inc/ProfileValue\}_{t-3}$	0.060	2.52	0.133	1.32	0.289	5.3		
$\Delta \log\{Inc/ProfileValue\}_{t-4}$			0.051	1.88	0.079	2.92		
$\Delta Married_{-1}$	-0.015	-0.43						
$\Delta Co - habit_{-1}$	-0.059	-0.98						
$\Delta Single_{-1}$	-0.055	-0.67						
$\Delta Child_{-1}$	0.009	0.66						
$\Delta Unemployed_{-1}$	-0.17	-3.44						
$\Delta Married_{-2}$			0.059	1.47				
$\Delta Co - habit_{-2}$			0.147	3.18				
$\Delta Single_{-2}$			0.146	2.39				
$\Delta Child_{-2}$			-0.032	-3.18				
Constant	0.011	4.56	0.021	8.00	0.022	8.07	0.001	0.101
σ	0.384		0.341		0.333		0.342	
σ levels	0.271		0.241		0.235		0.242	
AR(2) (N(0,1))	-0.32		-1.81		-0.38		-0.21	
Wald (Equation significance)	χ_8^2	168.9	χ_7^2	79.30	χ_2^2	28.19	χ_2^2	35.49
No. of observations	987		987		987		987	
Number of time periods	7		7		6		5	

Table 21: The Parameters of Equations for Forecasting log Income relative to the Profile Value

The sum of the coefficient on lagged income in the one-step equation is 0.64; in other words only 0.64 of past deviations of income from the profile value can be expected to persist one

period ahead. This reflects the short-term “noise” discussed above. Two periods ahead 48% of past deviations persists and three periods ahead this has fallen to 36%. When we look at how the deviation forecast three periods ahead persists into the fourth period, we can see that the regression coefficient is over one, implying that at this stage the process of regression to the mean ceases; there is also a small term in the lagged value of the forecast needed to remove residual serial correlation. We are, however, able to accept the restriction that the coefficient on the forecast is 0.95 and on its lagged value is zero ($\chi^2 = 0.75$); thus we can accept the hypothesis of continuing gradual convergence.

There is, however, a second issue. As noted above, the equations are estimated in differences. When integrated into equations in levels the constants become time trends. On comparing the fitted values generated by the data with the values of the log income ratios of the individual households, we calculate the mean values of the discrepancies as the individual-specific effects. When forecasting one, two and three periods ahead we assume that these individual effects persist; the equations are constructed on that assumption. On forecasting further ahead we assume that the individual-specific effects also converge to the mean at the rate of 5% per annum.

These individual effects include the consequences of any variables, such as ethnicity, gender and educational status which are *de facto* fixed over the sample period; thus they have no roles in the estimated equations. We do find, when forecasting two periods ahead, that changes in marital status and number of children do affect growth in income per effective household member; we have also included these variables one-step ahead, but it can be seen that their influence is largely swallowed up in lagged income. By the time we look three steps ahead they have lost their predictive power.

7 Parallel Evidence for Income Reversion

The econometric model we have set out above points firmly to a situation where very low and very high incomes are likely to be temporary. Other evidence to support this view can be obtained by looking at the proportion of households in our sample which are in poverty for various numbers of years in our data set. We can see from figure 2 that nearly 35% of households experienced poverty in at least one year of the sample. However only $2\frac{1}{2}\%$ suffered poverty for at least ten years of the sample. Thus for most people who suffered poverty it was not a permanent experience.

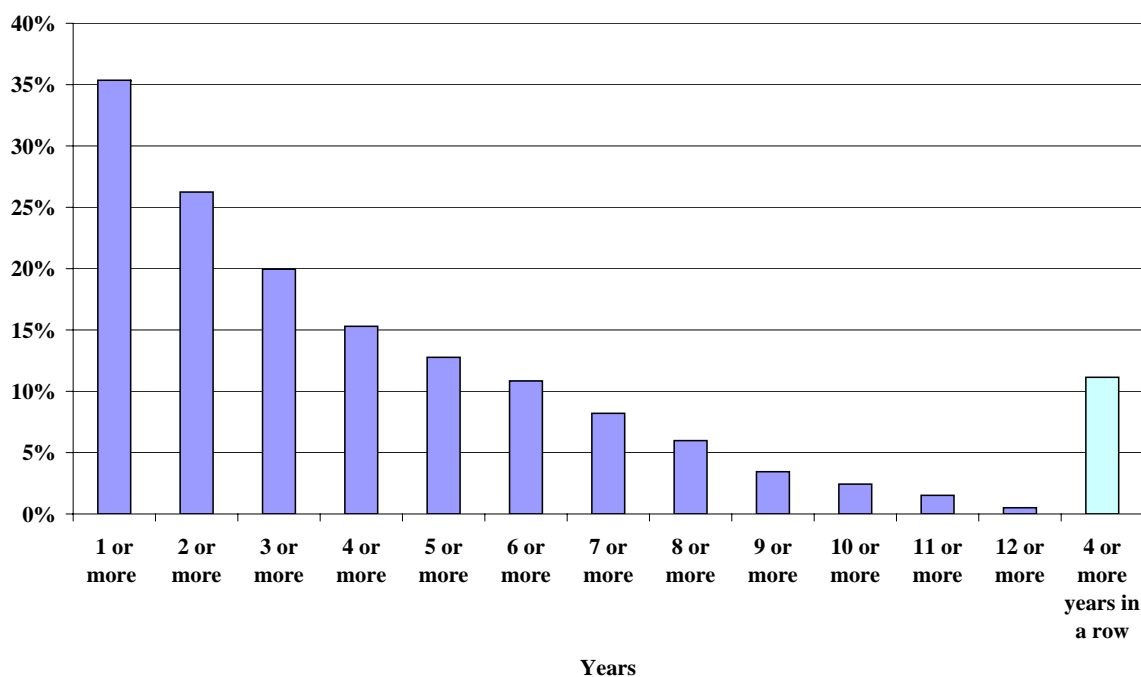


Figure 2: Indicators of Persistence of Poverty between 1991 and 2002

8 Performance of the Life-cycle Model

Given these equations which allow us to predict households' future incomes, and thus allow us to explore what households would borrow or save if they formed their expectations in the way the equations describe, and also plan for steady consumption growth over their remaining lives, we can now ask how the saving that they predict matches reported changes to wealth holding. It is plain from figure 1 that the average household in its twenties should anticipate

rising income while beyond forty-five incomes are expected to decline steadily. But at the same time, given that our equations imply that abnormally high and abnormally low incomes are expected, at least to some extent to move closer to the average, households with low incomes of almost any age are likely to be rational borrowers. One obvious question is to explore how far the predicted change in wealth holding generated by the model matches what change is observed in practice between the 1995 and 2000 data.

We are, however, also interested in the question how far financial problems or at least large debts may be a consequence of bad luck rather than mis-management. We explore this by assuming that people start initially with zero assets and liabilities. The predicted change in asset holding generated by our life cycle framework then indicates how much borrowing or saving they would have done given the income shocks that they actually experienced. The dispersion of assets/debts generated after five years from this standing start gives a good indication of how far large debts might be expected to be a consequence of bad luck.

We first address the question of how well the model works. We fit a regression equation explaining the observed change in wealth holding to the predicted change from 1995 to 2000 with the latter calculated assuming a real interest rate of 5% p.a. and a growth rate of income of 2% p.a. We have however assumed that neither income nor household spending grows once household heads reach the age of 65. Obviously there is the possibility that the change in asset holding generated by the life-cycle model may be a less than complete explanation and we therefore also include other explanatory variables. There are a number of clear candidates for these. The first is total wealth in 1995. Secondly, given that many people may not regard their houses as liquid assets but simply let house price increases accumulate, there is the value of housing wealth. Thirdly, if people do not save as a consequence of life-cycle behaviour, they may simply save through force of habit; income in the years between 1995 and 2000 needs to be included. Fourthly, saving behaviour may depend on people's ages even if not in the manner that the life-cycle model represents, so age and age² should be present. Finally there are a number of other characteristics such as education and gender which may influence saving and borrowing and these should also be included.

There are a couple of other considerations which should be borne in mind. First of all there is the problem of heteroscedasticity. If the analysis is carried out in money terms measured in prices of 2000, then the results will be dominated by households with large reported changes in asset holdings. In many cases one would remove this heteroscedasticity by working with variables expressed in logarithms. In this case, however, that is not possible because some changes in asset holdings are negative. An alternative is to divide by an appropriate scaling factor; we use the average of real income adjusted for household size in 1994 and 1995 as a

scaling term⁵. In fitting this regression we impose a 5% upper and lower trim to the reported changes in wealth as multiples of average 1994/5 incomes. For the reasons given by Pagan (1984) we have to use instruments to address the fact that the life-cycle change in wealth is a computed variable. We use log real income adjusted for household size from 1991 to 1995 as instruments. We also use instruments for the selection probability term. This is the probability that the household has non-zero wealth in 1995 and 2000 and the instruments are the variables shown in table 17.

The results of our regression analysis are shown in table 22 with successive restrictions introduced. with successive restrictions introduced. The χ^2 statistics test for the acceptability of these restrictions; all are accepted using conventional significance tests.

	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
Wealth	-0.212	-5.302	-0.222	-5.567	-0.226	-5.712	-0.209	-5.529
House Value	0.402	9.547	0.421	10.105	0.425	10.286	0.411	10.124
Fitted Value	0.383	2.008	0.190	2.131	0.194	2.191	0.306	5.337
Income, 1996	-0.058	-0.198						
Income 1997	-0.208	-0.826						
Income, 1998	-0.271	-1.145						
Income, 1999	-0.133	-0.636						
Income 2000	0.648	2.655						
Sex (Female=0, Male=1)	15.986	0.941	15.260	0.902				
Degree	-5.184	-0.239	-5.152	-0.242				
Age	-0.988	-0.262	-3.424	-1.409	-3.354	-1.767		
Age ²	0.026	0.393	0.071	1.666	0.071	1.865		
Selection Probability	0.185	0.303	0.085	0.140	0.091	0.150		
Constant	-0.049	-0.124	0.303	0.831	0.303	0.831	0.125	1.148
σ	1.648		1.651		1.650		1.651	
χ^2	9.77	5 d.f.	0.83	2 d.f.	3.51	3 d.f.		
All restrictions	14.12	10 d.f.						
838 observations								

The dependent variable is the change in asset holdings measured in 2000 prices per effective household member as a multiple of income per effective member averaged in 1994 and 1995

Table 22: The Relationship between Life-cycle Asset Accumulation and Actual Changes in Net Asset Holding

We can see that 1995 wealth enters with a strongly negative coefficient while house value enters with an even stronger positive coefficient. The coefficients on these terms are largely independent of the presence or absence of the other variables. They imply that wealth in 2000

⁵We use the average of 1994 and 1995 incomes (in £2000 after adjusting for family size) rather than income in just one year so as to damp the effects of erratic income movements in one year. It makes little difference if we use an average of three years' incomes as the scaling variable.

was reduced by about 20% of its 1995 value, but that this was offset by an increase in the value of housing wealth of 40%. Over the period house prices rose in real terms by about 45%. So one interpretation is that people spent 20% of their wealth over the period but, subject to this which applied equally to houses and other wealth, they let the rise in house prices add to their wealth. This is in broad terms consistent with the buffer stock model set out by Carroll (1997) The income terms in the individual years present a confused picture, with negative terms in all years except 2000, where the term is significantly positive on the basis of a conventional statistical test. However we are able to accept a χ^2 test that the income terms can be restricted to zero. Zero restrictions on the other terms, including the sample selection term are also easily accepted. The final model shows a strongly significant term in the savings flow computed from the life cycle model; however the coefficient on this is only 0.3 with the implication that households were doing only 30% of the necessary life-cycle savings, at least on the assumption that they want their consumption to grow at 2% p.a. until retirement at 65 and then to keep constant consumption after that.

This analysis presents an overall guide as to the relationship between the life-cycle framework and reality. It does not, however, address questions about the link between poverty and debt, or address the question whether people with low incomes fail to borrow as much as is sensible. We explore this latter issue from two perspectives. In figure 3 we show the distribution of net asset accumulation as predicted by the life cycle model, measured as a proportion of income per effective household member averaged across 1999 and 2000.

The chart shows that over 40% of households should have accumulated between zero and once their average incomes over the period. Similarly 19% of households should have accumulated more than 1.5 times their incomes in 1999/2000; these households had incomes which were unlikely to remain as high as they were. However 18% over households should have run down their assets or borrowed on the grounds that they should expect their incomes to rise. Nearly 6% of households should have borrowed at least the average of their 1999 and 2000 incomes. We explore the characteristics of these households in more detail in table 23. It is clear that the households which “should” be borrowing are younger than the sample, tend to have relatively more female heads, have experienced markedly higher unemployment (measured as the proportion of years between 1996 and 2000 in which the household head has reported her/himself as unemployed) and have larger numbers of children. Looking at income measured in prices of 2000 and adjusted for family size as discussed earlier with an adult couple counting as one, we can see that for much of the period the people who “should” have borrowed at least once of their incomes between 1995 and 2000 suffered from incomes well under half of the average in all years between 1996 and 2000. In 2001 and 2002 their incomes rose fairly sharply

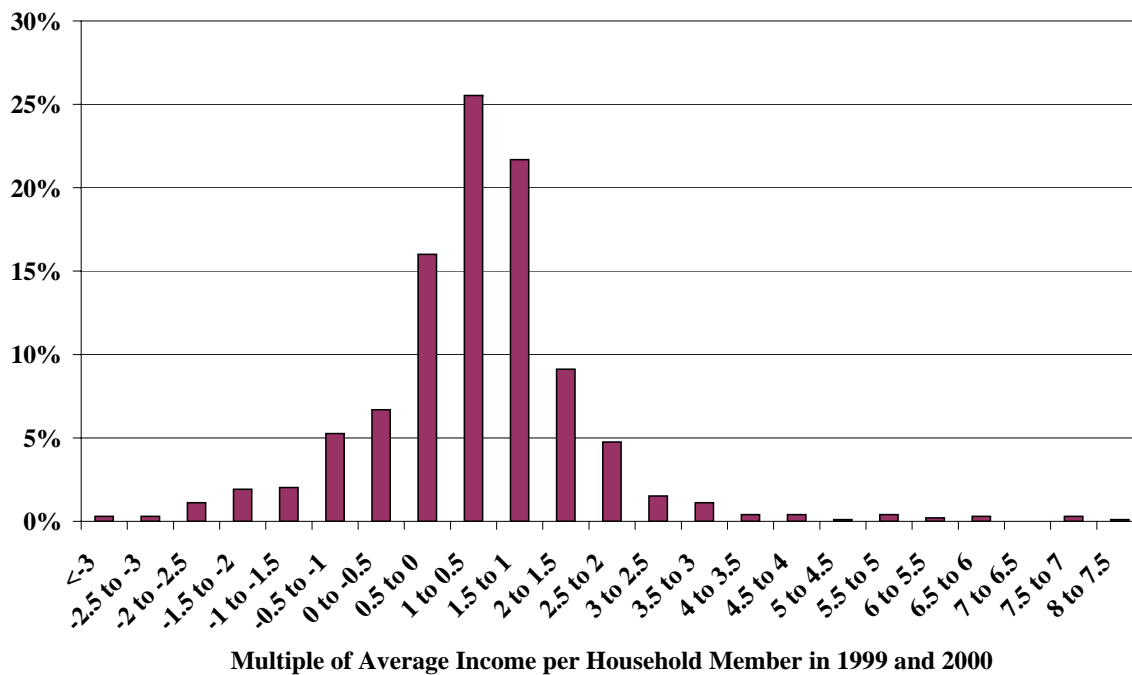


Figure 3: The Distribution of Life-cycle Net Asset Accumulation between 1995 and 2000 as a Multiple of Average Household Non-property Income per Effective Member in 1999 and 2000

so that by the end of the period their incomes were about 2/3 that of the whole sample. If we look at the group of all households which should have decumulated during the period, we can see that the picture is similar but less pronounced. They are also younger than the whole sample with more children, higher unemployment and lower incomes. Again their incomes rise relative to the population during the period from about half of the average in 1995 to nearly three quarters in 2000.

Table 23 also shows the characteristics of households which owned negative net assets in 2000. They too were younger, more likely to have female heads, more unemployment prone and with larger families than the whole population. But on all of these metrics the differences were lower than for the households which “should” have borrowed. Their incomes were closer to those of the population mean and less inclined to rise sharply than the incomes of households for whom life-cycle borrowing is desirable. On the other hand, compared to 1995 these households have reduced their borrowing to some extent. We also look at the category of households which reduced their asset holding, the actual wealth reducers. These were even more like the whole population than were any of the other groups, except that initially they owned more wealth than the whole population. In the absence of any excess wealth holding they should have

been accumulating rather than decumulating wealth as the figure for life-cycle change in wealth shows.

	Whole	Actual	Actual	Large	All
	Sample	Debtors	Wealth	Life-cycle	Life-cycle
			Reducers	Borrowers	Borrowers
Age	42.2	36.47	41.72	31.9	34.69
Wealth in 1995	2.61	-0.52	3.87	1.63	1.26
Change in Wealth	1.45	0.26	-1.40	0.89	0.87
Wealth in 2000	4.06	-0.26	2.47	2.53	2.13
Life-cycle Change in Wealth	0.86	-0.13	0.76	-1.80	-0.89
Unemployment Risk	2.8%	7.7%	3.0%	8.1%	6.6%
Number of Children	0.85	1.34	0.91	2.29	1.77
Proportion with Household Head	71.9%	62.7%	68.8%	51.8%	67.1%
Income adjusted for Household Size (2000 prices)					
1996	18808	13696	17815	7529	9452
1997	19104	13388	17340	7679	9728
1998	19085	13366	17370	7285	9807
1999	19605	14880	17544	8311	10935
2000	19848	15562	17967	9855	12335
2001	20993	16834	19258	12663	13986
2002	21801	16662	20237	14564	15326
Number	987	75	249	56	173

Table 23: Net Wealth and Life-cycle Saving of all Households in the Sample: 1995-2000

A similar analysis of households in poverty in 1995 presents a very different picture. Figure 4 shows the distribution of the net change in asset holding at 2000 prices adjusted for household size between 1995 and 2000 measured as a multiple of average income adjusted for household size in 1999 and 2000 at 2000 prices. We find that 57% of households in poverty in 1995 should be net borrowers over the period. 33% of them should reduce their net asset holding by more than 100% of their income averaged in 1999 and 2000. That the need for life-cycle borrowing is concentrated among people in poverty is not in itself very surprising; with poverty defined as an income after adjusting for household size of below 60% of the median, the poverty line in 1995 was an income adjusted for household size of £9081 measured in prices of 2000. The proportion of households in poverty in 1995 (121/987) is low compared with that in the overall data set (561/2858) because we are looking only at those with heads aged 21-59 in 1995; a disproportionate number of households in poverty are headed by people over the retirement age.

When we look at the households on which we have full data which were actually in poverty in 1995, the above picture is re-inforced. The large life-cycle borrowers show income levels well below those of the average household in poverty. They have considerably more children

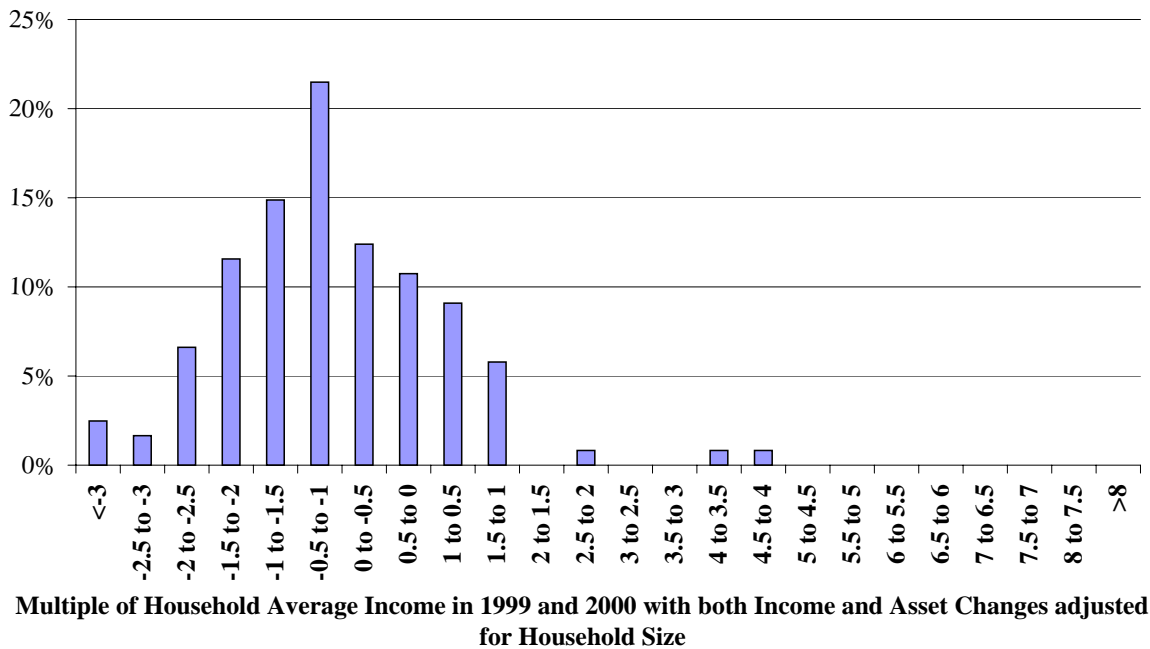


Figure 4: The Distribution of Life-cycle Net Asset Accumulation between 1995 and 2000 for Households in Poverty in 1995

than the average household and nearly 2/3 have female heads; the average age of the head is low compared to that of all heads of households in poverty. Their incomes were substantially higher at the end of the period than for the bulk of the 1990s and they should have borrowed substantially; on average instead they saw their wealth rise rather than fall during the period 1995-2000. Much the same is true of one looks at the households which should have done any life-cycle borrowing although, as we also saw above, the difference from the average household in poverty is less marked.

The households which started in poverty in 1995 and had negative net assets in 2000 also, on average had negative net assets in 1995. They borrowed slightly further during the five years but, as the table shows, not nearly as much as the life-cycle model would have suggested. Nearly 2/3 of the household heads of this group are also female and the reported unemployment rate is almost twice that of the average household in poverty in 1995 and nearly five times that over the average household in the sample as a whole. If we look at the households which actually reduced their wealth between 1995 and 2000 and started in poverty in 1995 there is an important distinction from the other categories. These households reduced their wealth by more than the life-cycle model suggested, given a zero starting asset position. This was

	All Households in Poverty	Actual Debtors in 2000	Actual Wealth Reducers	Large Life-cycle Borrowers	All Life-Cycle Borrowers
Age	41.1	35.8	38.7	31.9	35.9
Wealth in 1995	2.79	-0.04	4.47	1.66	1.67
Change in Wealth	1.44	-0.14	-1.50	0.67	0.82
Wealth in 2000	4.23	-0.17	2.97	2.33	2.49
Life-cycle Change in Wealth	-0.47	-1.24	-0.82	-1.92	-1.25
Unemployment Risk	7.6%	13.0%	5.9%	6.5%	8.9%
Number of Children	1.27	1.74	1.46	2.35	1.76
Proportion with Male Head Income	55.4%	35.0%	41.2%	37.5%	53.9%
1996	6758	5832	6336	6369	6470
1997	8415	8442	7857	6975	7728
1998	9527	7611	8324	7457	7963
1999	9761	8844	8900	7307	8325
2000	11315	9415	9663	8089	9548
2001	11205	10492	10624	9288	10908
2002	12372	10671	10695	11560	12299
Number	121	47	34	39	76

Table 24: Net Wealth and Life-cycle Saving of Households in Poverty in 2000

facilitated by the fact that they had relatively favourable initial asset holdings.

Most discussion of debt and indebtedness focusses on the problems faced by households with large debts. But our analysis here draws attention to the fact that there are also a considerable number of households and particularly poor households which might be better off if they borrowed on the basis of expected future changes to their incomes but which were in practice unwilling or unable to borrow. There are a number of factors which may explain this. One is that households in poverty may be concerned that if their situation does not improve they will be saddled with debts they cannot manage; in other words it is risk aversion on their part rather than an inability to borrow which explains their failure to borrow, between 1995 and 2000 as much as future experience might have justified. A second reason is that they are able to borrow but only at much higher interest rates than the $7\frac{1}{2}\%$ p.a. which we have assumed here. It is a question for further research to examine how far risk aversion is an obstacle to borrowing. But at the same time it is clear that people in poverty have trouble in obtaining access to credit on reasonable terms. Even credit unions, one of the vehicles favoured by the government as a means of providing affordable credit tend to charge interest at just over $12\frac{1}{2}\%$ p.a. and much sub-prime borrowing is at higher interest rates than this.

9 Conclusions

This analysis presents a dichotomy between the behaviour of households trying to smooth their consumption over their life-times and observed patterns of borrowing and financial asset accumulation. We have found evidence in both 1995 and 2000 that both unsecured and secured borrowing depends in part on expected changes in income over the next two years. Other influences on borrowing include gender, age and education level. Young people are more likely than old people to have unsecured debts and holdings are also a function of age; while they decline for people with reasonably high incomes as they age, there is some evidence that people with low incomes do not succeed in reducing their debts as they age. The provision of state benefits means that poor people have less need to save for retirement than do people on higher incomes. Nevertheless this failure to reduce debt levels with age is a cause of concern.

While one would expect households anticipating income increases to borrow more than those which do not, the opposite is might be expected to be true of wealth holding. Other things being equal, households anticipating increase in income have less need of wealth than those households which do not; we do not, however, find a role for expected future changes in income in aggregate wealth holding. Perhaps not surprisingly house ownership is a strong determinant of wealth holding; households owning their own homes have much more wealth than those which do not, after one allows for other influences.

An alternative to the econometric perspective set out above is provided by setting up a system to forecast household incomes on the basis of their circumstances. Given this we are able to estimate household life-time resources and thus to work out how much spending and saving each household might be expected to do in the light of its current and future expected income. There are two important influences on this. First of all, households of people in their twenties can anticipate rising incomes in the future. For them borrowing is a sensible economic decision. Secondly, the tendency for short-term income fluctuations to decline means that people on low incomes can also have a reasonable expectation of rising income. For these too borrowing is a sensible economic decision.

A comparison of the changes in asset holdings predicted by this analysis with actual changes in asset holdings suggests that only 30% of the predicted changes are reflected in actual changes in asset holdings. Over and above this there is a tendency for people with large amounts of wealth to reduce their holdings. But since house prices rose in real terms by 45% between 1995 and 2000, this was offset by increasing wealth as a result of increasing house prices.

If we explore in greater detail the characteristics of people who should have been net borrowers between 1995 and 2000, we find that 18% of households aged 21-59 in 1995 should, given

a zero net asset position, have been reducing their wealth holding over the next five years. These households had low incomes for most of the periods, although the shortfall relative to the mean was considerably smaller in 2000 and after than in the second half of the 1990s. The households were also younger than average and tended to have larger numbers of children than average. They also suffered from a high rate of unemployment. Thus they were in situations of temporary poverty and would have raised their welfare by borrowing to tide them over these circumstances of temporary poverty. In fact their wealth holdings, from an initial positive position rose rather than fell over the period.

If, instead, we explore the characteristics of those households whose wealth holdings declined, or which held negative net assets in 2000, these appear to be people much more like the average of the population than are the life-cycle borrowers. In age, family size and income the differences with the average are much smaller.

These findings point to a rather stark conclusion. Over the period 1995-2000 the wrong people were borrowing. Or at least those who would sensibly have borrowed on average did not do so, while a population not very different in character from the average population did reduce its wealth holdings. Borrowing has a clear economic function; it allows people to tide themselves over periods of temporarily low income. The fact that people who might have benefitted from borrowing did not do so, ought to be of as much concern as is the fact that other people were borrowing in appropriately

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Appendix: The Life-cycle Model

We carry out our analysis on a household rather than an individual basis, because in many cases it is not possible to allocate household assets sensibly across individuals. Household size of course changes over time; it costs more to look after two adults than after one but not twice as much. Children are cheaper than adults to care for. We use the McClements scale to assess the number of equivalent adults in each household and assume that life-cycle planning is

designed to deliver consumption growth at a constant rate⁶, g , of consumption per equivalent adult, c_t . Thus consumption in period $t + k$ is given, with $G = 1 + g$ as

$$c_{t+k} = c_t G^k$$

The constant rate of interest is r with $R = 1 + r$. In period t income per effective adult is y_t . This excludes income from property such as savings and investments and also the costs of servicing debts⁷ (because the return on net assets is included as ra_t) but we refer to it simply as income for convenience. With the variables defined thus, we can write the following recursive arrangements for asset holdings per effective member at the start of period t , denoted a_t and y_t

$$a_{t+1} = R(a_t + y_t - c_t)$$

If we assume that household expects to die at the start of period T and does not plan to leave any bequest, we require that $a_T = 0$. Thus we can write, with $y_{k,t}$ being the income forecast in period t to accrue in period k and $c_{t,k}$ denoting planned consumption in the same period,

$$\begin{aligned} 0 &= R^{T-1-t} a_t + \sum_{k=t}^{T-1} R^{T-1-k} (y_{k,t} - c_{k,t}) \\ &= R^{T-1-t} a_t + \sum_{k=t}^{T-1} R^{T-1-k} (y_{k,t} - c_t G^{k-t}) \\ &= R^{T-1-t} a_t + \sum_{k=t}^{T-1} j R^{T-1-k} y_{k,t} - c_t \sum_{k=t}^{T-1} R^{T-1-k} G^{k-t} \end{aligned} \quad (1)$$

whence

$$c_t = \frac{R^{T-1-t} a_t + \sum_{k=t}^{T-1} j R^{T-1-k} y_{k,t}}{\sum_{k=t}^{T-1} R^{T-1-k} G^{k-t}}$$

This can alternatively be written as

$$c_t = \frac{a_t + y_t + \sum_{k=t+1}^{T-1} R^{t-k} y_{k,t}}{1 + \sum_{k=t+1}^{T-1} R^{t-k} G^{k-t}}$$

⁶If we assume that the household has a utility function $U = \sum_{T=t}^{t_{\max}} D^{T-t} \frac{c_T^{1-\theta}}{1-\theta}$ where t_{\max} is a known upper limit to life and D is a discount factor, and if the household expects a constant interest rate R , maximising expected utility subject to the budget constraint yields the standard expression

$$E \left\{ \left(\frac{c_{t+1}}{c_t} \right)^{-\theta} \right\} = \frac{D}{R}$$

We also assume that expectations are point expectations; this then gives a growth factor for consumption of $G = 1 + g = (R/D)^\theta$. Since variations in household size have an effect similar to variations in the interest rate, this specification assumes that expected household size is constant.

⁷In many cases households are not aware of the value of their pension rights in occupational pension schemes. The measure of income we use is "take home" income after deduction of any contributions and we count future income gross of any pensions received. Thus we treat private sector pensions in the same way as state pensions.

showing how consumption depends on initial assets, a_t , current income, y_t and discounted expected future income $\sum_{k=t+1}^{T-1} R^{t-k} y_k$. With this specification, unlike the simple expositions of the permanent income hypothesis (Campbell, 1987, Lusardi, 1997) the propensity to consume out of both current assets and present and discounted future income rises as the consumer ages towards the age of death, $T-t$. The extent to which an income shock of given size affects current spending and therefore asset accumulation depends both on the impact it has on forecast future income and on the remaining life-span.

From these expressions we can now write down the expression for a_{t+1}

$$\begin{aligned} a_{t+1} &= R \left(a_t + y_t - \frac{a_t + y_t + \sum_{k=t+1}^{T-1} R^{t-k} y_{k,t}}{1 + \sum_{k=t+1}^{T-1} R^{t-k} G^{k-t}} \right) \\ &= R_t \left(1 - \frac{1}{1 + \sum_{k=t+1}^{T-1} R^{t-k} G^{k-t}} \right) (a_t + y_t) - R \frac{\sum_{k=t+1}^{T-1} R^{t-k} y_{k,t}}{1 + \sum_{k=t+1}^{T-1} R^{t-k} G^{k-t}} \end{aligned}$$

If we now set

$$\begin{aligned} \Theta_t &= \left(1 - \frac{1}{1 + \sum_{k=t+1}^{T-1} R^{t-k} G^{k-t}} \right) \\ h_t &= \frac{\sum_{k=t+1}^{T-1} R^{t-k} y_{k,t}}{1 + \sum_{k=t+1}^{T-1} R^{t-k} G^{k-t}} \end{aligned}$$

then

$$a_{t+1} = R\Theta_t(a_t + y_t) - Rh_t \quad (2)$$

so that

$$a_{t+k} = R^k \prod_{j=t}^{t+k-1} \Theta_j a_t + \sum_{n=t}^{t+k-1} \left(\prod_{j=n}^{k-1} R\Theta_j \right) (y_n - h_n \Theta_n^{-1}) \quad (3)$$

This shows asset holdings in period $t+k$ depending positively on initial asset holdings compounded by the rate of interest but after adjusting for spending out of current assets and also on income received in each period, compounded in the same way. Expectations of future income, h_t however have a negative impact on asset holdings. The reason for this is clear. People who expect their income to rise have less reason to save than those who do not expect their income to rise. Exploring the formula further it is also possible to show that it implies that those who have had negative income shocks will have asset holdings lower than those who have not been disappointed by their income expectations. Thus the formula provides a means of understanding how adverse shocks to income lead to low levels of asset holding or alternatively high levels of debt.