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Debt and Health

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Abstract

Debt problems in the UK have recently become much more severe, especially for the lowest income groups, and we examine here their impact on health, using data from the national Families' and Children's Survey (FACS). We model the relationship between debt and health as a simultaneous two-way interaction, and find that debt levels have a negative effect on both physical and psychological health. We find that debt repayment *structure*, defined as the percentage of debt borrowed in high-interest categories, has an impact on health independent of the level of debt. The interaction between debt and health may aggravate the poverty trap, by pushing heavily-indebted low-income people into ill-health, which then makes it difficult for them to acquire or hold on to the steady jobs needed to ease their debt problems. We also find that worry has a negative influence on debt management capacity, and thence on health, which makes it more difficult for those caught in a debt trap to escape from it. Membership of credit unions tends to reduce worry, however, and thereby may facilitate escape from the debt-ill health spiral.

JEL *Classification*: G11; I31

Keywords: Debt, Health, Random effects ordered probit models

1. Introduction

In Britain, debt and debt-associated problems are growing at record rates. At £1.3 trillion or £3175 per capita, personal debt exclusive of mortgage borrowing is double the level of £1588 found in continental Europe¹, and since the mid-1970s, the ratio of household debt to income has risen from 50 per cent to around 140 per cent (*Independent*, 6 July 2007). Most worryingly, the problem impinges particularly seriously on the lowest income groups. More than half the households with serious debt problems are in the lowest income group, earning less than £11,500 a year at 2004 prices, and between 1995 and 2000, the ratio of debt to income for this group more than doubled, from 16% to 36%, a much faster increase than for any other income group (Office of the Deputy Prime Minister, 2004: page 1). More recently it has been reported that the high level of debt in the UK is magnifying the effects of the current credit crunch². This situation not only puts pressure on the debt-servicing capacity of the badly-off, but runs the risk of embedding them in a poverty trap, since many of these lower income groups are unable to access credit from the high-street banks and are forced to finance their consumption, particularly at Christmas and other peak expenditure periods, at prohibitive interest rates from doorstep lenders, loan sharks and other informal sources of credit at many times the rates charged by mainstream financial institutions³. The burden of repaying these loans, in turn, may crowd out essential consumption by adults and children and aggravate their poverty.

In this paper we examine one of the many negative implications of this situation, the effects of debt on health. As previously suggested by a range of papers (Drentea 2000, Brown, Taylor and Wheatley-Price 2005, Bridges and Disney 2006) highly-indebted people tend to experience higher levels of psychological stress and depression, which currently afflict about six million people, or one in six of the UK population, and take up at least one-third of GPs' time (London School of Economics 2006). Such impacts, if widely experienced among the worse-off, are apt to reinforce the 'poverty trap' dimension of debt previously referred to, since a slide into depression is likely to prejudice a person's status in the labour market, which reduces their ability to repay debt, which *ex hypothesi* aggravates depression. A further implication is that any action which is taken to reduce the volume of debt or to make it more manageable would reduce the burden on the National Health Service.

Through this paper, we build on existing research in four specific ways. First, in addition to the link known to exist between psychological health and debt we examine whether there exists a link between debt and physical health. As has widely been acknowledged by the popular press, debt problems have been blamed for the onset of a large number of health

¹ Report by Datamonitor, quoted in *Independent*, 28 September 2006, page 2. Comparative data on debt levels in European countries are provided by Crook and Hochguertel (2006)

² *The Times*, 19th March 2008.

³ Collard and Kempson (2006) offer a typology of different types of informal credit. They devote particular attention to 'home lenders' or doorstep lenders who have been able to take advantage of the oligopolistic structure of the sub-prime credit industry to charge annual percentage interest rates of more than 200% to many customers for short-term consumption loans.

conditions especially among vulnerable people, including even suicide⁴. This may occur, we hypothesise, both because worry about debt aggravates a number of medical conditions and because it inhibits rational behaviour, in particular in the area of health-seeking behaviour and in the area of debt management itself.

Second, by contrast with previous authors we attempt to explicitly trace the links in the chain of causation from debt to health and from health back to debt. Our hypothesis is that *debt management capacity* constitutes a key influence on health-seeking behaviour, and we seek in this research to understand the social and individual correlates of debt management capacity.

Third, we seek to understand the influence of debt *structure*, as well as debt size and manageability, on indicators of health status: there are currently no available research findings on this issue. We hypothesise that what matters for the well-being of individuals is not just how large their debts are in relation to their capacity to repay them, but also how those debts are distributed between low-interest debt which can be flexibly negotiated and expanded at small cost in response to circumstance and high-interest debt which is subject to rigid repayment terms and may entail the loss of precious assets and freedoms if not repaid strictly on time. Since low-interest debt is not readily available to those without security, the scope for low-income families to escape from a high debt - poor health poverty trap by changing their debt structure may be limited, and we wish to ascertain the extent to which this is so by including a measure within our model that captures the effect of repayment structure on debt management.

Finally, and following on from this, we investigate what kinds of *institutional and policy measures* might be capable of intervening within the processes of circular causation sketched above. Specifically, if either the provision of reasonably-priced credit facilities, or the provision of advice, were able to influence people's debt management capacity or the costs of servicing their debts that would by the previous argument have positive downstream effects on their health and other indices of well-being. We wish to explore what scope may exist for influencing health by measures which impinge on debt rather than on health directly.

2. The approach

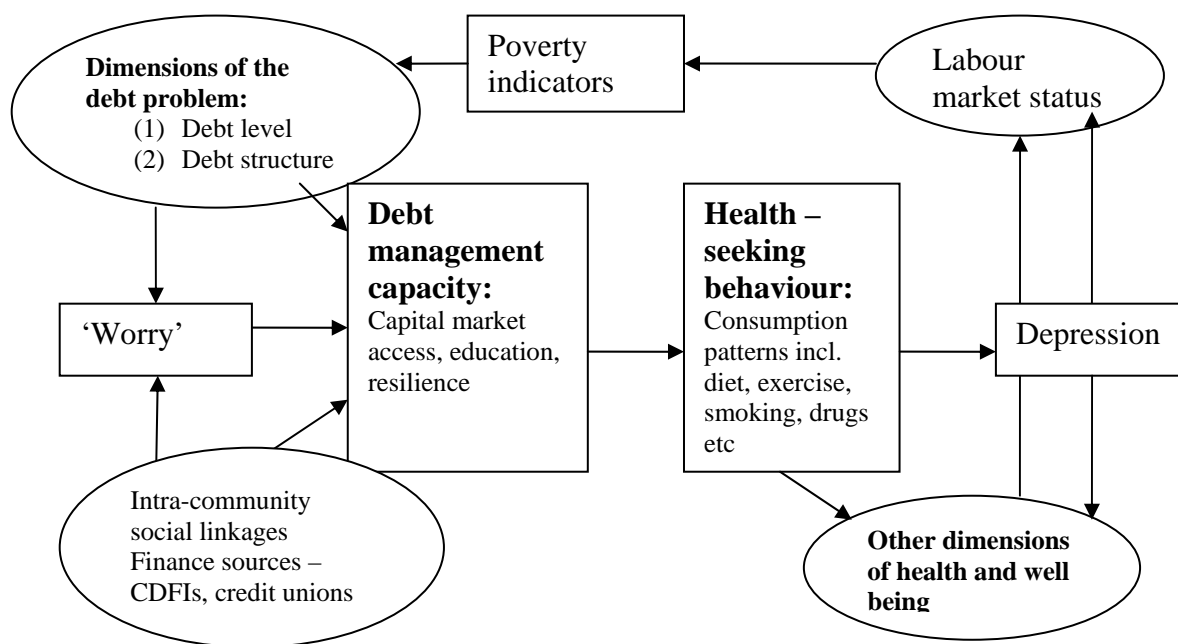
(i) The model

As discussed above, we visualise the interaction between debt and health as being a process of circular causation, as represented in Figure 1. Debt causes worry; worry impinges on health both directly and through health-seeking behaviour; poor health inhibits ability to escape from debt, especially for low-

⁴ *Metro*, 17 November 2006. This article reported the suicide of a Cardiff University student who had debt problems. Contrary to popular perceptions, many of the severest debt problems are amongst the young: research by the National Union of Students (2007) suggests that 40% of young people would not know where to turn to for support and advice if they got into money trouble.

income households. We emphasise that for us, ‘the debt problem’ comprises not only the volume of debt, but also its structure. Individuals with few assets, who neither are house-owners nor have access to a secure income, will typically be unable to borrow at low interest, and may be forced either to use credit cards, if they can get hold of them, or to seek loans from ‘doorstep lenders’ or ‘loan sharks’ on terms which themselves inhibit effective debt management: not only is the charge for credit so high as to completely wipe out the borrower’s room for financial manoeuvre⁵, but the methods used to compel repayment used by sub-prime lenders, often involving intimidation and threats of violence, add to the anxiety suffered by the borrower, thereby further depleting their ability to cope rationally with their debt burden. We surmise that both the inability to escape from an adverse debt structure and the process of worrying about this situation are adverse influences on health-seeking behaviour and on health, and we wish to understand their interconnection.

Figure 1. Links between debt and health



The principal links in the chain of causation are the following:

(1) *The link from debt to health* (the lower part of figure 1): this runs from debt size and structure, to ability to manage debt, to health-seeking behaviour, to

⁵ A cross-sectional sample of twenty borrowers interviewed in four cities in 2006 and 2007 revealed the average annual percentage rate charged by home credit companies (e.g. National Provident, Greenwoods) was 365% (Lenton and Mosley, 2009 forthcoming). These loans often include hidden charges, and insurance premiums which are not necessarily obvious, especially to those with low levels of financial literacy. There are estimated to be some 2.5 million clients for home credit in Britain (Brooker and Whyley, 2005) almost all of them on low incomes. The reason given for borrowing at these interest rates is typically ‘because there is no alternative’ (e.g. interview, Carol Wainman, Sheffield, 23 May 2007): Often loans are taken from these companies simply to clear existing debts.

health both physical and mental. Worry is potentially a significant negative influence on ability to manage debt, and social links within the community and fair-priced sources of credit counteract worry and are potential positive influences.

Thus for the health of any individual i we write the hypothesis we wish to explore as:

$$H_i = f_1(h, s, m, (W))(Q_d, P_d, X) \quad (1)$$

where: H = Reported health (good/fairly good/poor)
 Q_d = indicator of debt burden (e.g. size of debt)
 P_d = indicator of debt repayment structure (high, medium, low-interest)
 W = a self-reported measure of 'worry' about debt
 m = reported ability to manage one's debt
 h = indicators of physical and mental health
 s = health-seeking behaviour
 X = a vector of personal characteristics

(2) *The link from health to debt* (the upper part of the diagram in fig.1): poor health may influence an individual's capacity to repay debt, in particular because it reduces the hours an individual is able to work, and /or restricts the range of tasks s/he is able to perform. This effect may work with quite a long lag. Thus our debt equation is estimated as:

$$D_i = f_2(l, r, H, X)(H_{-1}) \quad (2)$$

where: D_i is the probability of an individual having a debt problem, l is the number of labour hours supplied, r is the individual's remuneration, H is current health, H_{-1} is lagged health and X a vector of personal characteristics.

(3) *The role of worry* is influenced by debt and debt size, and also impacts upon debt management capacity. Thus our 'worry equation' is:

$$W_i = f_3(Q_d, P_d, n, S, X) \quad (3)$$

where Q_d , P_d , and X are defined as above and

n = a measure of 'institutional support' counteracting the debt problem (e.g. debt advice, sources of fair-priced credit, savings institutions)

S = a measure of 'social support' counteracting the debt problem (e.g. friendships, family, membership of relevant affinity groups)

(ii) *Data and methods*

The paper uses data from the Families and Children Survey (FACS) from 2003 through 2005. This is an annual survey of UK households who are eligible for, or in receipt of, Working Families' Tax Credit.⁶ The dataset provides us with a rich, and so far relatively underutilised, set of family demographics. In particular, and ideally for our purpose, the survey provides information on work, health, family assets, savings and debts, comprising both objective and quantitative measures of assets, income and expenditure and subjective self-assessments of measures of well-being (including health) and also responses to questions about feelings and attitudes such as propensities towards saving and borrowing.⁷ We use the observations from heads of households in families who participated in each of the three surveys to provide us with a panel of 5717 respondents.⁸ The questionnaire is administered annually by means of an interview with the respondent.

We begin our modelling with an analysis of the effect of debt on health. The *dependent variable*, H , in the health equation (equation (1)) is a subjective answer to the question of whether the respondent's health, over the past twelve months, has been 'poor', 'fairly good' or 'good'. This type of self-reported measure of health is common in the health literature (Bridges & Disney 2005). Therefore we estimate a random-effects ordered probit model in order to assess the influences on the probability of being in any one of the three outcome categories. Our *independent variables* include the indebtedness measures previously discussed and a range of variables seeking to capture debt repayment structure (P_d). *Health-seeking behaviour* is inferred from responses to questions about smoking (number of cigarettes smoked per week), drinking (amount of alcohol units drunk per week) and whether the respondent buys good quality food. Unfortunately, FACS does not contain any information on other elements of health-seeking behaviour such as taking regular exercise, hence our measure of health-seeking behaviour is inevitably incomplete⁹. A novel feature of our model is that we are able to identify the take-up of credit to each household as being in one of three possible categories; *high credit* (the respondent uses credit cards, or money lenders but has no bank loans or mortgage, such that we would expect this individual to be paying a high price for his/her credit); *low credit* (the respondent has a mortgage but no other type of loans); and *mixed credit* (the respondent has all forms of credit available). An additional and crucial independent variable in the health equation, *worries* (W), which also features as a dependent variable in equation (3), is computed from the four possible answers to the question, 'Do you worry about debt problems?'¹⁰ Finally we

⁶ The Families and Children's Survey prior to 2001, was of low income families only and known as the Survey of Low Income Families (SOLIF). However, in 2001 the sample was increased to include all income groups and thereby provides a dataset more representative of UK families.

⁷ The British Household Panel Survey provides data on finances in wave 5 and 10. However, it does not provide the detail that FACS provides, such as attitudes to debt.

⁸ The number of respondents reduces to 5692 when we exclude observations with missing information.

⁹ Through work financed by Glasgow City Council and the Sheffield Regional Health Consortium (see Lenton and Mosley 2009) we are seeking to correlate access to finance with a more complete measure of health-seeking behaviour.

¹⁰ Answer to this question about levels of worry include always; often; seldom; and never. We convert this measure into a binary indicator which records unity where the individual worries often or always.

include the amount of debt burden deflated to 2003 prices. Thus we define $J + 1 = 3$ outcomes in our ordered probit model as follows:

Poor health ($y = 0$)
 Fairly good health ($y = 1$)
 Good health ($y = 2$)

The ordered probit log likelihood is written as:

$$\ln L = \sum_{t=1}^J \sum_{j=1}^N \sum_{i=1}^k I_i(y_j) \ln p_{ijt} \quad (4)$$

where t is time and $I_i(y_j) = 1$ if $y_j = i$.

We assume that individual unobserved heterogeneity across time follows a normal distribution, and thus we estimate a random-effects model.

In the debt equation (equation (2)) the dependent variable representing the probability of being in debt D , is *indebt*, which is binary and indicates simply whether or not the respondent claims to be in debt and where an amount of debt has been recorded in the survey; and is therefore estimated using a random-effects probit model, given as:

$$\text{Prob}(y_{i1}, \dots, y_{in}, | \mathbf{x}_{i1}, \dots, \mathbf{x}_{in},) = \int_{-\infty}^{\infty} \frac{e^{-v_i^2 / 2\sigma_v^2}}{\sqrt{2\pi\sigma_v}} \left(\prod_{t=1}^{ni} F(y_{it}, \mathbf{x}_{it}\boldsymbol{\beta} + v_i) \right) dv_i \quad (5)$$

where:

$$F(y, z) = \Phi(z) \quad \text{if } y \neq 0$$

or $1 - \Phi$ otherwise

and where Φ is the cumulative normal distribution.

The independent variables within this model include those discussed above plus lagged health since poor health may not impact upon debt immediately, especially if the individual is able initially to draw on savings. Personal characteristics include the respondent's age and disability status (which is calculated from the type of illness/es indicated following a positive response to the question "do you have an illness or disability?") ethnicity (which due to small numbers is coded as white or non-white), and whether a respondent works full time, part-time or doesn't work. We also include family background variables including whether married, number of children, socio-economic status given by the type of occupation and whether a respondent's partner works. Household income is calculated as income from work, partner's work and any benefits, such as incapacity benefit or child benefit. Savings and the amount of debt are also included¹¹. In order to assess whether the magnitude of the debt matters more than simply being in debt we also replace the probability of being in debt with the total value of debt, *debts*, as the dependent variable in a random effects regression model.

In our third estimation (equation 3) we turn to the determinants of worrying about debt. We estimate random-effects probit models, as outlined above, to ascertain the determinants of worrying about debt. We seek to examine whether the determinants of worry about going into debt are different

¹¹ Where no savings (debts) are reported a value of zero is recorded.

across income groups, and therefore we estimate these models separately for all families in our sample, for families who have household incomes below the poverty line and for those with incomes above the poverty line. In our analysis we distinguish between those households that fall below the standard Office for National Statistics poverty line of 60% of median household income¹². Additional variables included in these models are assets, which include savings, the amount of which is recorded in the survey, and whether the family house is owned outright or bought through a mortgage. There is no question in the survey that asks about the value of the family house where respondents have indicated that it is owned or mortgaged; however, the survey records the council tax band of the property, from which we have been able in each region to estimate a value for each property. We are able to calculate a total assets variable by summing housing assets and savings, and also to calculate a variable to capture the total debt- to-assets ratio. Social capital, defined in FACS as the respondent's reply to the question 'do you have someone to turn to for cash or advice?' is included as an additional explanatory variable. Finally, FACS asks whether a respondent is a member of a credit union or savings group – potentially a key policy variable, as in some localities credit unions and community development finance institutions are able to provide consumption credit in competition with high-priced credit sources such as the pawnbrokers and home lenders discussed above.

It is likely that debt both causes ill-health (through the mechanisms discussed in relation to equation 1) and is caused by it through the effects of ill-health on labour market status and thus on ability to service debt. We model this simultaneous interaction by means of a simultaneous-equation generalised probit model (Amemiya 1978)¹³ of the form:

$$y_1^* = \gamma_1 y_2^* + \beta_1' \mathbf{X}_1 + \mu_1$$

$$y_2^* = \gamma_2 y_1^* + \beta_2' \mathbf{X}_2 + \mu_2 \tag{6}$$

where y_1^* is the latent propensity to report being in debt and y_2^* the latent propensity to report one's health status¹⁴. Health may be affected both by debt level and debt management capacity, and so both of these measures are used to represent the debt variable y_1^* in this equation. These models are estimated for each of our three years. The independent variables include those discussed above relating to the models of being in debt and health.

3. Descriptive statistics

Table 1 presents a descriptive picture of the sample in 2005. The sample consists of recipients of Working Families' Tax Credit; hence throughout the period respondents to the survey were mainly female.

¹² This varies across households as it is dependent on the size and structure of the family unit. The median figures of those of 60% and 50% of the median income are taken from Department of Work and Pensions statistics, available at <http://www.dwp.gov.uk/asd/statistics.asp>

¹³ This model is run using the `cdsimeq` command in STATA10 which estimates a simultaneous model where there exists a binary and a continuous variable.

¹⁴ The standard errors are corrected as necessary within the `cdsimeq` command in Stata10.

Table 1. Descriptives

	Whole sample N=3 x 5692		Non-poor N=3 x 5157		In poverty N =3 x 535	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
<i>Health indicators</i>						
Reported Health ⁺	2.59	0.66	2.60	0.66	2.50	0.71
Depression	0.02	0.13	0.02	0.13	0.19	0.14
Physical illness	0.18	0.39	0.18	0.39	0.21	0.41
Depression and physical illness	0.02	0.14	0.02	0.13	0.02	0.15
Depression*incapacity benefit	0.01	0.08	0.01	0.08	0.003	0.06
Physical illness *incapacity benefit	0.02	0.14	0.02	0.14	0.02	0.15
Both illnesses* incapacity benefit	0.01	0.07	0.01	0.07	0.01	0.07
<i>Health-seeking behaviour</i>						
Smoker	0.29	0.45	0.28	0.45	0.38	0.49
Number cigarettes of smokers	4.6	8.4	4.4	8.2	6.0	9.1
Weekly units of alcohol	4.1	19.5	4.2	20.5	3.5	6.2
Buys good food	0.83	0.38	0.84	0.37	0.72	0.45
<i>Financial indicators</i>						
Reported in debt	0.14	0.34	0.13	0.33	0.23	0.42
Reported in debt and can't cope	0.06	0.23	0.05	0.22	0.11	0.31
Household income weekly (£)	548.00	648.82	587.94	668.71	163.01	69.28
Savings	10456	63757	11156	66867	3705	10007
House owned outright	0.09	0.29	0.09	0.30	0.15	0.36
House owned-mortgaged	0.61	0.49	0.64	0.48	0.40	0.49
Social housing	0.29	0.46	0.27	0.45	0.45	0.50
House asset (£)	58170	57497	59316	56863	47137	62270
High interest credit only	0.03	0.18	0.03	0.18	0.06	0.24
Low interest credit only	0.12	0.33	0.13	0.33	0.11	0.31
Mixed interest credit	0.84	0.37	0.84	0.36	0.83	0.37
<i>Debt structure and attitudes to debt</i>						
Housing arrears (rent/mortgage £)	15.9	194.5	14	172	35.9	343
Household bill debt £	62.5	363	55	318	135	650
Card debt £	11	259	12	272	6	57
Total debts £	793	1290	792	1310	807	1197
Debt to total assets ratio	3.4	73.6	3.4	75.5	3.6	52.0
Worries about getting into debt	0.25	0.43	0.23	0.42	0.41	0.49
Cash aid ⁺⁺	0.26	0.44	0.25	0.43	0.34	0.48
Saves in a credit union ⁺⁺⁺	0.01	0.11	0.01	0.11	0.01	0.09
Below 60% median income	0.09	0.29	-	-	-	-
<i>Household/ respondent characteristics and demographics</i>						
Age	39.4	8.0	39.5	7.8	39.0	9.7
Male	0.01	0.11	0.01	0.10	0.02	0.15
Couple	0.73	0.45	0.74	0.44	0.62	0.49
Number of children	1.9	0.91	1.9	0.93	1.9	0.75
Non-white	0.08	0.27	0.08	0.27	0.08	0.28
Manager/professional occupation	0.15	0.35	0.15	0.36	0.08	0.27
Skilled non-manual occupation	0.27	0.44	0.28	0.45	0.17	0.37
Skilled manual occupation	0.02	0.13	0.02	0.41	0.02	0.14
Unskilled non-manual occupation	0.21	0.40	0.21	0.41	0.17	0.38
Unskilled manual occupation	0.11	0.31	0.11	0.31	0.11	0.31
<i>Labour market</i>						
work16f	0.10	0.29	0.10	0.29	0.10	0.30
work16-30	0.28	0.45	0.28	0.45	0.24	0.43
Work30	0.34	0.47	0.35	0.47	0.13	0.33
Partner employed	0.36	0.48	0.37	0.48	0.21	0.41

⁺Reported health is an ordered response from 1 to 3 with 1 being poor, 2 fairly good and 3 good. ⁺⁺Cashaid = 1 if respondent is able to borrow money from friends, family or employer. ⁺⁺⁺Credit union = 1 if respondent is a saver in this type of institution.

The descriptive statistics reveal that the income of the sample is slightly below UK average income (at £548/week) but not significantly so. 9% of the sample, which is lower than the proportion for Britain as a whole, is below the poverty line of 60% of median income¹⁵. There is however some evidence that the sample, even if not income poor, is *asset* poor, since the average value of housing equity, even allowing for the 30% of the sample who are not house owners, is £58,000, which is well under half the average value of the UK housing stock. 8% of the sample is non-white and 2% of the sample report that they suffer from depression.

If we examine the differences between those below the poverty line and the non-poor, there are, first, differences in health (significantly in favour of higher income groups, as one would expect, and significantly greater for depression, which is ten times as great for the poor as for the non-poor group, than for physical illness). Second, there are substantial differences in health-seeking behaviour. The poor within the sample are more likely than the non-poor to be smokers and are also more likely to be heavy smokers. The proportion 'buying good food', at 72%, is a little, but not significantly lower, among the poor than the non-poor. (By contrast, alcohol consumption is slightly lower amongst the poor than the non-poor).

Partly consequent on and partly a cause of these differences in health-seeking behaviour (as in the model of Figure 1), we surmise, there are also very large differences in worry between the two groups (60% higher for poor than for non-poor) and in capacity to manage debt, measured by the yardstick of those 'worried and already in debt' (twice as high for poor as for non-poor). Some of the most significant differences are in debt structure: twice as many poor as non-poor are in the 'high credit' group forced to seek credit on adverse terms, and more than twice as many have arrears on their housing payments.

4. Results

In table 2 we report the results from our random effects ordered probit model of health. As we would expect, individuals who are in work are most likely to report good health. Individuals who report having a specific health problem – either physical, mental or both – not surprisingly, are least likely to report being in good health. This result is consistent with the finding that individuals with outstanding credit are most likely to report lower levels of psychological health (Brown *et al* 2005). The socioeconomic status variables all accord with the literature in that those individuals higher up the socio-economic scale, such as managers, professionals and skilled non-manual workers, are more likely to report being in good health than those in unskilled manual occupations. The estimates on our health-seeking behaviour variables are generally well behaved, with smokers being least likely to report good health; also, eating good food increases the likelihood of reporting good health. We note that increased units of alcohol increase the probability of reporting good health (although the coefficient is small). Our explanatory variables relating to debt and repayment structures have strong significance in

¹⁵ Income in 2005- approximately £11500 per annum for a single parent with one dependent child.

the model. Worrying about debt reduces the probability of reporting good health and is highly significant. Being faced with a low-interest repayment structure, i.e. having access to ‘cheaper’ methods of financing immediate debts, has the effect of significantly increasing the probability of reporting good health, and being faced with high interest credit has a negative although insignificant direct impact upon reporting good health.

Table 2. Random Effects Ordered Probit model: Determinants of Health

Dependent variable = Health		
	Coefficient	Standard error
Age	-0.007	0.016
Age square	-0.000	0.000
Male	0.109	0.159
Non-white	-0.100	0.064
Couple	0.194	0.041
Number of children	0.014	0.019
Partner employed	0.029	0.035
work30 hours plus	0.213***	0.054
work16 hours plus	0.196***	0.051
Work less16 hours	0.220***	0.059
Managerial/professional occupation	0.226***	0.061
Skilled non-manual occupation	0.206***	0.051
Skilled manual occupation	-0.019	0.119
Unskilled non manual occupation	0.90*	0.050
Health-depression only	-1.611***	0.103
Health- physical only	-1.313***	0.038
Health – both	-2.071***	0.118
Depression*benefit	-0.216	0.196
Physical*benefit	-0.904***	0.099
Health both*benefit	-0.670***	0.277
Household income	0.000**	0.000
Savings	0.000***	0.000
Good food	0.086**	0.037
Number smokes	-0.091***	0.014
Units of drink	0.005*	0.003
Below 60% median income	0.020	0.048
Worries about debt	-0.396***	0.033
High interest credit	-0.014	0.055
Low interest credit	0.112**	0.047
Total amount of debt	-0.000***	0.000
Diagnostics:		
N= 16310	LR chi ² (30) = 2834.80	
Log likelihood = -10381.162	Prob > chi ² = 0.0000	

Base category is white, single, not working, unskilled manual occupation, no health problem, mixed credit available, non-poor and doesn't worry about debt.

We now present (table 3) estimates of the random-effects probit model of the probability of reporting being in debt (equation 2). The significant coefficients on our age explanatory variables indicate that young people are

more likely than older people to be in debt, suggesting that they have lower aversion to debt. . As we expect, those individuals who report having a health problem are more likely to report debt than the healthy, and those who reported an illness in the previous year are significantly more likely to find themselves in debt. This is also reflected in the work variable where the hours of work supplied, reduces the likelihood of reporting debt, especially for people who work 30 hours or more. Household income and savings work in the 'right' direction, although their effects are small. It is also interesting and worrying to note that many individuals with health problems, despite being in receipt of incapacity benefit, are still falling into debt. However, of great interest to us is that our worry variable and our repayment interest rate structure are all highly significant, supporting our intuition that being faced with a high-interest repayment structure actually exacerbates debt problems.

Table 3. Random effects probit model: Determinants of being in debt

Dependant variable = Indebt		
	Coefficient	Standard error
Age	-0.085***	0.025
Age squared	0.001*	0.000
Male	0.635***	0.225
Non-white	-0.232**	0.105
Couple	-0.594***	0.064
Number of children	0.241***	0.030
Partner employed	-0.216***	0.065
Work 30 hours plus	-0.150**	0.075
Work 16-29 hours	-0.099	0.077
Work fewer than 16 hours	-0.108	0.094
Managerial/professional occupation	-0.594***	0.113
Skilled non-manual occupation	-0.595***	0.085
Skilled manual occupation	-0.219	0.192
Unskilled non-manual occupation	-0.229***	0.075
Health problem - depression	0.542***	0.138
Health problem - physical	0.215***	0.062
Health problem - both	0.477***	0.139
Reported poor health in previous year	0.358***	0.075
Incapacity benefit	0.107	0.098
Household income	-0.001***	0.000
Savings	-0.000***	0.000
Below 60% median income	-0.057	0.068
Worries about debt	1.065***	0.048
High interest credit	0.576***	0.076
Low interest credit	-0.452***	0.087
Constant	0.768*	0.080
Diagnostics:		
N= 16310	LR chi2(25)	= 1381.47
Log likelihood = -4396.0056	Prob > chi2	= 0.0000

Base category is white, single, not working, unskilled manual occupation, no health problem, mixed credit available, non-poor, doesn't receive invalidity benefit and not worried about debt.

In Table 4 we report the results from our random effects regression of the determinants of the size of debt. The coefficients all follow the same direction as our previous model: higher socioeconomic status and work hours protect against debt, and having a health problem increases the amount of debt. We note that having reported a health problem in the previous year leads to a greater increase in debt size than reporting a physical health problem now, which suggests that debt mounts up on those who are sick and unable to work and once again is not counteracted by the payment of incapacity benefit. Once again we note the statistically significant effect on debt from the type of interest rate repayment structure. It is also interesting to note that the effect on the increase in the debt amount due to being faced with high interest credit only is much larger (by nearly three times) than the reduction in the debt size due to having low interest credit.

Table 4. Random effects regression: Determinants of the amount of debt

Dependant variable =Lndebt2		
	Coefficient	Standard error
Age	-0.107***	0.018
Age squared	0.001***	0.000
Male	0.570***	0.183
Non-white	-0.223***	0.072
Couple	-0.586***	0.043
Number of children	0.170***	0.021
Partner employed	-0.107***	0.034
Work 30 hours plus	-0.148***	0.055
Work 16-29 hours	-0.143***	0.053
Work fewer than 16 hours	-0.110*	0.060
Managerial/professional occupation	-0.337***	0.061
Skilled non-manual occupation	-0.353***	0.052
Skilled manual occupation	-0.106	0.125
Unskilled non-manual occupation	-0.160***	0.052
Health problem - depression	0.660***	0.107
Health problem - physical	0.170***	0.042
Health problem - both	0.511***	0.110
Reported poor health in previous year	0.288***	0.056
Incapacity benefit	0.124*	0.074
Household income	-0.000	0.000
Savings	-0.000	0.000
Below 60% median income	0.120**	0.048
Worries about debt	1.035***	0.034
High interest credit	0.574***	0.057
Low interest credit	-0.199***	0.046
Constant	3.511***	0.326
Diagnostics:		
N= 16310	Wald chi ² (25) = 2964.62	
R ² overall 0.2482	Prob > chi ² = 0.0000	
Rho = 0.4166		

Base category is white, single, not working, unskilled manual occupation, no health problem, mixed credit available, non-poor, doesn't receive invalidity benefit and not worried about debt.

We now turn our attention to the determinants of worry, as this variable has a strong influence in both our models of health and debt. Table 5 presents estimates for the random effects model of the probability of worrying about money, for our full sample and for our sub-samples of those families that have incomes above our poverty line (subsample A) and those with incomes below our poverty line (subsample B). The models are estimated using data from 2003 through to 2005. Across all models the effect of being in a couple and working full time serves to reduce the probability of worrying. The direct effect of health on worry depends on the type of health problem. Reporting simultaneously a physical health problem and depression has the effect of significantly increasing the probability of worrying in all our samples. The positive effect on worrying from having a physical health problem is significant across all our samples. However, the strong positive influences on worry from reporting depression and from reporting a health problem twelve months previously is not significant for subsample B.

Worry is strongly associated with poverty, and we surmise that it is also associated with a lesser ability to manage debt, as shown in figure 1. The focus of worry relating to the structure of debts in the full sample may lead one to the conclusion that house arrears and bill debt are the main cause of worry; however, when we examine the coefficients in the models for our subsamples a different picture emerges: the biggest worry for those in subsample A is housing arrears and bill payments, whilst for those in subsample B it is their credit card debt and being unable to pay bills, with the effect on worry being much stronger for subsample B. Housing arrears are not a worry for subsample B. Worry, again as per figure 1, is negatively associated with health-seeking behaviour; smoking impacts positively on worry in all models, although there is a possibility of reverse causality here, with those who are worried being more likely to smoke.

There is a positive impact of high-interest debt on worry, much stronger and more significant for lower income groups; thus the multiplier effect which worry adds to the impact of debt on health is greatest for those least able to control or manage that debt¹⁶. A high debt-to-assets ratio impacts positively on debt – which is interrelated with the previous finding because it is the lack of assets which poor people can present as security which undermines their ability to negotiate low-interest debt. We note the strong and statistically significant *positive* influence of our social capital measure on worry. This is initially puzzling, but the direction of causality here probably runs from worry to social capital, with those who are worried being more likely to turn to friends, family and advice centres for help. As a potential ray of hope, however, we note that saving in a credit union, greatly reduces – at the 10% level of significance - the level of worry for the low-income subsample B.

The link from debt to health, therefore, is mediated, as we hypothesised in Figure 1, by the intervening variables of debt management capacity and health-seeking behaviour. We see worry as interacting with debt structure to constrain the decision space available to low-income people to pursue health-seeking behaviour, both financially because poor people, once

¹⁶ Thus we see worry unambiguously as a negative influence on debt management capacity, on health-seeking behaviour, and through both of these channels on health. This contrasts with some references in the epidemiological literature which see worry as a stimulus, in general to greater effort, and specifically to greater health-seeking behaviour. We are grateful to John Brazier for this observation.

caught in a high-debt, high repayment-charge, low credit-rating equilibrium have no scope to reschedule their debts and thereby find a less worrisome way forward, and psychologically, because the inability to perceive a way forward undermines the capacity for debt-management which could underpin health-seeking behaviour. Thus for many poor people, debt does indeed undermine health; but it does so in indirect as well as direct ways.

Table 5. Random effects Probit models: The Determinants of Worry

Dependent variable= Worry about debt	Full sample		Subsample (A) Above poverty line		Subsample (B) Below poverty line	
	Coefficient	Std Err	Coefficient	Std Err	Coefficient	Std Err
Age	-0.077***	0.020	-0.092***	0.021	0.040	0.046
Age sq	0.001***	0.000	0.001***	0.000	-0.000	0.001
Male	-0.355***	0.203	-0.339	0.216	-0.305	0.451
Non-white	0.233***	0.080	0.265***	0.083	-0.008	0.240
Couple	-0.516***	0.051	-0.517***	0.055	-0.465***	0.134
Number of children	0.112***	0.024	0.126***	0.025	0.034	0.076
work30 hrs plus	-0.329***	0.066	-0.329***	0.070	-0.459**	0.424
work16 hours plus	-0.216***	0.062	-0.228***	0.066	-0.168	0.190
Work less16 hours	-0.101	0.071	-0.045	0.075	-0.704***	0.234
Partner employed	-0.089	0.044	-0.080*	0.046	-0.285*	0.170
Debt/assets ratio	0.001**	0.000	0.001**	0.000	0.011*	0.006
Card debt	0.0001***	0.000	0.0001***	0.000	0.002*	0.001
Bill debt	0.0004***	0.000	0.0005***	0.000	0.001***	0.000
House arrears	0.0004***	0.000	0.0004***	0.000	0.000	0.000
High credit	0.126**	0.068	0.068	0.074	0.427**	0.195
Low credit	-0.125**	0.059	-0.145**	0.062	0.103	0.184
Health- depression	0.579***	0.122	0.584***	0.131	0.643	0.394
Health- physical	0.193***	0.050	0.194***	0.052	0.278*	0.148
Health- both	0.916***	0.131	0.845***	0.139	1.416***	0.432
Poor health last year	0.303***	0.064	0.335***	0.068	0.239	0.179
Incapacity benefit	0.249***	0.003	0.252***	0.091	0.172	0.238
Household income	-0.0004***	0.000	-0.0005***	0.000	0.002*	0.001
Manager/professional	-0.211***	0.077	-0.197**	0.080	-0.254	0.295
Skilled non-man	-0.121**	0.063	-0.111*	0.066	0.015	0.215
Skilled manual	0.156	0.150	0.118	0.156	0.835	0.565
Unskilled non-man	0.003	0.061	-0.006	0.065	0.254	0.197
Social capital	0.518***	0.039	0.510***	0.042	0.705***	0.126
Credit union saver	-0.230	0.181	-0.177	0.187	-1.329*	0.758
Number smoked	0.106***	0.017	0.102***	0.018	0.127***	0.046
Below Povertyline	0.149***	0.057	-	-	-	-
Constant	0.852***	0.363	1.143***	0.383	-1.782**	0.867
Diagnostics:						
Rho		0.563		0.566		0.541
LR Rho test stat		1301.76		1097.43		41.35
N		16310		14882		1428
Log Likelihood		-7233.8057		-6487.9806		-792.68233
Wald chi ² (30)		1354.59	(29)	1176.77	(29)	07.72
Prob > chi2		0.0000		0.0000		0.0000

Base category is white, single, not working, unskilled manual occupation, no health problem, non-smoker, mixed credit available, non-poor, doesn't save, doesn't receive invalidity benefit and not worried about debt.

Finally we report in Table 6 the results of our simultaneous models of health and debt. The estimations are reported for 2005, our latest year of data. The likelihood ratio tests indicate that together all included variables are significant. The first finding, in the top two rows of both parts of the table, is that debt and health significantly impact on each other, with the magnitude of the coefficient on predicted health being larger than the coefficient on predicted debt. Therefore, being in debt has a negative impact on reporting good health, the impact of which is greater in cases where the respondent acknowledges that they can no longer manage their debt. The effect of reporting good health serves to reduce the probability of being in debt, the magnitude of which is similar regardless of whether the respondent can manage their debt or not. This finding accords with that of Bridges and Disney (2005) who in examining the link between depression and debt find that the probability of reporting debt is higher where an individual is depressed and that the probability of reporting depression increases where an individual is reported in debt.

The coefficients on age reveal that the young are more likely to be healthy and also have a higher probability of being in debt, which may reflect that young people have less experience in money management. The coefficient on age in the simultaneous model is only slightly lower than that in our random-effects probit model of debt reported in Table 3. Other positive and significant influences on the probability of reporting debt include being male, having a large number of children, and having access only to 'high interest' credit.¹⁷ The influence of worry on the probability of being in debt is still very strong in the simultaneous estimation despite a slightly smaller coefficient compared to that on worry in the probit model shown in Table 3. We also note that whilst most of the other coefficients in the simultaneous model are slightly smaller than those reported in the probit model, there is one exception, which is the debt repayment structure variable 'high interest credit'. When we model health and debt as simultaneously determined the strength of this factor increases, reflecting the impact of of the debt repayment structure variables.

The aggravating factors on health are being out of work, being single, and, as earlier surmised, smoking (other non-health-seeking behaviours are insignificant), and worry (highly significant in both estimations). Worrying about money leads to a reduced probability of reporting good health; in addition, worrying has a strong and highly significant influence on being in debt and unable to manage.

¹⁷ Social capital, in these estimations, is also and contrary to our hypothesis (page 5 above) *positively* associated not only with being in debt, but being in debt and unable to cope. We strongly suspect that this result is due to the phrasing of the questions in FACS such as, 'Over the past 12 months have you borrowed money from friends?' and 'Relatives lend you money/buy you goods'. It appears that those people answering these questions positively consist in large part of people who already have borrowed money in this way and who as a consequence are most likely to be in debt.

Table 6. Simultaneous-equations estimation: health and debt

	Estimation 1: health in relation to the state of being in debt				Estimation 2: health in relation to being in debt and can't manage.			
	Health		In debt		Health		In debt & reports can't manage	
	Coeff	S.E	Coeff	S.E	Coeff	S.E	Coeff	S.E
Predicted indebt	-0.115***	0.025	-	-	-0.215***	0.048	-	-
Predicted health	-	-	-0.549***	0.107	-	-	-0.535***	0.137
Age	-0.016**	0.007	-0.065***	0.024	-0.010	0.009	-0.001	0.032
Age squared	0.000	0.000	0.001*	0.000	0.000	0.000	-0.000	0.001
Male	0.059	0.070	0.579***	0.194	0.089	0.094	0.433	0.282
Non-white	-0.056**	0.028	-0.204**	0.099	-0.119**	0.046	-0.379***	0.156
Couple	0.043**	0.021	-0.222*	0.066	0.053*	0.029	-0.035	0.099
Number of children	0.027***	0.010	0.186***	0.028	0.023*	0.012	0.077**	0.038
Partner employed	0.002	0.019	-0.201***	0.073	0.028	0.030	-0.003	0.115
work30 hours plus	0.137***	0.027	-0.152**	0.078	-0.143***	0.039	-0.008**	0.115
work16 hours plus	0.126***	0.026	-0.068	0.072	0.111***	0.037	-0.068	0.107
Work less16 hours	0.142***	0.031	-0.093	0.105	0.132***	0.045	-0.060	0.152
Manager occupation	-0.010	0.033	-	-	-0.022	0.055	-	-
Skilled non-manual	-0.002	0.029	-	-	-0.038	0.039	-	-
Skilled manual	-0.014	0.063	-	-	-0.006	0.102	-	-
Unskilled non-manual	-0.005	0.025	-	-	-0.013	0.036	-	-
Health-depressed	-0.867***	0.057	-	-	-0.809***	0.071	-	-
Health- physical	-0.608***	0.020	-	-	-0.612***	0.027	-	-
Health - both	-1.125***	0.054	-	-	-1.024***	0.070	-	-
Poor health last year	-	-	-0.199*	0.120	-	-	-0.145	0.156
Household income	0.000	0.000	-0.000*	0.000	-0.000	0.000	-0.001***	0.000
Savings	-0.000***	0.000	-0.000***	0.000	-0.000***	0.000	-0.000***	0.000
Social capital	-	-	0.544***	0.055	-	-	0.399***	0.078
Good food	0.008	0.021	-	-	-0.065*	0.035	-	-
Number smokes	-0.017**	0.008	-	-	-0.019*	0.010	-	-
Units of drink	0.000	0.001	-	-	0.001	0.000	-	-
Below poverty-line	0.032	0.026	-0.001	0.084	0.014	0.035	-0.096	0.116
Worries about debt	-0.042	0.029	0.735***	0.057	-0.165**	0.073	1.322***	0.098
High interest credit	-	-	0.824***	0.108	-	-	0.499***	0.122
Low interest credit	-	-	-0.307***	0.097	-	-	-0.101	0.139
Constant	1.891***	0.137	0.985**	0.466	1.459***	0.202	1.385**	0.641
	2 nd stage regression		2 nd stage probit		2 nd stage regression		2 nd stage probit	
	N= 5692		N= 5692		N= 5692		N = 5692	
	Adj R ² = .3218		R ² = .3459		Adj R ² = .3233		R ² = .3967	
	F(25) =109.00		LL = -1579.82		F(25) =109.74		LL = -743.28815	
	Prob>F= 0.0000		Lchi ² (19)=1493.4		Prob>F= 0.0000		LRchi ² (19)=977.32	
			Prob>chi ² =0.000				Prob>chi ² = 0.0000	

4 Conclusions and implications for policy

We therefore find evidence of a two-way pattern of causation running from health to debt, and vice versa. We have found that it is not only psychological health which is affected by debt, but physical health also, and that there are two intermediating variables which crucially influence the nature of the linkages from debt to health: these are *debt repayment structure* and *worry*, both of which we find to have a significant influence on health-seeking behaviour. Both of these affect the portion of the sample identified as having a

household income that is below the poverty line compared to the full sample, and therefore may be seen as hard-to-open gateways which in many cases keep the poor locked within the poverty trap. The debt structure gateway is hard to open because the poor, being without significant savings or assets, cannot for that reason obtain credit without paying a substantial risk premium, the paying of which removes all room for manoeuvre in managing debt. The worry gateway is hard to open because much worry is occasioned, as table 5 makes clear, by things which are often hard to alter – in particular low income, low assets, and ill-health and debt themselves.

How, therefore, can the gateways be opened? One factor making the debt structure gateway hard to open is the highly imperfect nature of the sub-prime credit market in the UK, with low-income clients often having little knowledge about the price they pay for credit¹⁸, and the market for home credit being extremely oligopolistic, with 69 percent of the home credit market dominated by four suppliers¹⁹. The way forward may therefore rest with institutional and policy innovation to make this market work better, and one possibility is opened by one of the coefficients identified in the worry equations in Table 5 – the significant and negative coefficient of credit union membership on worry. If credit union membership reduces worry amongst lower income groups, could a broadening of credit union membership, and by extension of other financial institutions offering fair-priced credit, thereby improve health-seeking behaviour and thus health? In the last couple of years, this route has begun to be explored – the Government, in the wake of a ‘supercomplaint’ against the monopolistic charges of doorstep lenders made by the Office of Fair Trading in 2006, has condemned the practices of loan sharks and other unlicensed lenders²⁰, has established a Financial Inclusion Growth Fund which supports institutions able to compete with these institutions, and in many cities ‘community development finance institutions’ have emerged as (usually) not-for-profit lenders offering fair-priced credit to heavily indebted consumers, as well as businesses (Mosley 2004, Lenton and Mosley 2009). It should also be emphasised that a key element in existing market imperfections is lack of knowledge of available financial products, and not only financial institutions but other voluntary agencies such as Citizens’ Advice Bureaux have for many years played an important role in filling this knowledge gap. One limitation of our data was the scanty information provided on support networks.

An important element in a future research agenda is, therefore, to understand what role this kind of institutional provision may have in improving debt management, and in consequence health, through the routes indicated in this paper. Existing writings on depression, and specifically the LSE survey quoted on page 2 above, suggest that resources are being wastefully spent on sickness and incapacity benefit which could be saved by the application of

¹⁸ Across a sample of 220 low-income individuals in Glasgow, Sheffield and Derby who were clients of home-credit institutions, a substantial majority (71%) did not know the (annual percentage) interest rate (APR) which they paid on their borrowings from these institutions (Lenton and Mosley 2009 forthcoming). Actual APRs paid by home-credit borrowers are extremely high, often over 300% (see footnote 6 above); but few interviewees, on being prompted, showed any awareness that the interest rates they were paying might be even a quarter of this level.

¹⁹ Provident Financial (incorporating Greenwoods), Cattles (incorporating Shoppacheck), London and Scottish Bank and S&U. Collard and Kempson 2005:2.

²⁰ Press release, Treasury website, 25 January 2007.

'evidence-based psychological therapies' (LSE 2006, page 1). However, still more money in our judgment can be saved, not only in social security benefits but also on the NHS drugs and staff budget, if those people who are currently suffering from illness or depression because they are in debt could be released from worry, if not from debt itself, by debt counselling and fair-priced loans. It is to be emphasised that the policy suggestions we have made are not remotely the only ones which may be relevant to this issue, and it may well be that further mileage resides in conventional incentives towards health-seeking behaviour, such as the publicity on nutrition and exercise put out by the Health Education Council, by local authorities and other bodies. But further investigation into the cost-effectiveness of 'therapies' which operate through their effects on debt structure and debt management capacity would seem well warranted.

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