Who is overindebted: the roles of health, financial literacy and risk aversion??

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Aim and Structure

Aim: To model the relationships between overindebtedness and its determinants and to test various hypothesised causes.

- Introduction

- Literature

- Data

- Methodology

- Results

- Conclusions

Concepts of Overindebtedness

No common definition.

EC(2008) operation definition should involve 6 elements:

- Unit of measurement should be household
- All contractual financial commitments should be included
- The ability to pay agreed financial commitments
- Need to measure long-term financial state not incidental occurrence
- Overindebtedness implies HH cannot pay contractual commitments without reducing its standard of living
- HH cannot "correct" its position by using its assets or taking more debt

- EC (2014) from the above:

A HH is overindebted if, on an ongoing basis it finds it difficult to pay its commitments including meeting payments for any type of debt or the payments of rent, utility or household bills.

No commonly accepted list (EC 2014).

Indicator Group	Example
Debt Service Ratios (DSR)	HH spends > X% of (gross/net) monthly income on total borrowing repayments (for secured and unsecured loans) (X typically = 50%)
	HH spends >X% of (gross/net) monthly income on secured loans (X typically = 25%, 30%, 50%)
Affordability	Borrowing repayments takes the HH "below the poverty line"
Delinquency	HH is > A months in arrears on credit commitments of HH bills (A typically =2)
# Loans	If HH has more that Z credit commitments (Z typically =4)
Perception of debt burden	HH reports repayments are a "heavy burden" HH reports difficulty in paying unexpected bills

Adapted from D'Alessio & Lezzi (2013).

Weaknesses with all.

LC-PIH: Individual maximises expected discounted utility from consumption with inter-temporarily separable preferences, uncertain income, time preference rate equal to interest rate ($\delta = r$ so $\beta. R = 1$).

Without credit constraints intertemporal budget constraint is: $A_t = R. A_{t-1} + y_t - c_t$ where $R = (1 + r)$

In general, optimality condition: $u'(c_t) = E_t[u'(c_{t+1})]\beta R$ where E_t denotes expectations at time t

Kapteyn et al (2005) show

$$A_t = \sum_{k=1}^{t} R^{t-k} E_1 y_k + R^t A_0 - \left(\frac{R^t - 1}{r}\right) y_{p1} - \sum_{k=2}^{t} \left(\frac{R^{t-k+1} - 1}{r}\right)(c_k - E_{k-1}c_k) + \sum_{k=2}^{k=t} R^{t-k}(y_k - E_1 y_k)$$

Unexpected
Consumption shock

Unexpected
Income shock

where A_t = assets at time t; c_t = consumption in time t; y_{p1}= permanent income in period 1. If $A_t < 0$ there is a demand for debt.

1. If unexpected income shock is very negative, consumption changes little and only by annuity value and A_t could become very negative ("overindebted").

2. If unexpected consumption shock is very positive A_t could become very negative ("overindebted").

Causes of unexpected (negative) income shocks:

- poor health,
- loss of job,
- relationship breakdown,
- price inflation exceeding nominal income inflation,
- loss of capital income,
- unexpected increase in cost of servicing debt.

Similarly unexpected consumption increases can increase debt/assets ratio.

Possible causes of unexpected consumption increases:
- Poor health
- Physical capital (appliances, car) breakdown

- Debt relative to assets may increase for other reasons

- Poor financial calculations of payments to service a loan

- Hyperbolic discounting: plan consumption and take debt at time t based on a subjective discount rate δ_t when in periods $t + j$ $(j \geq 1)$ discount rate is actually lower than δ. (discount rate error).

Empirical Literature 1

Differing results between papers.

	Positive	Negative	Not sig
Age	Inverted U Bryan et al 2010	Camoes (2010), Angel (2015)	Cifuentis (2020), Meyll & Pantis (2019)
Female	Bryan (2010)	Cifuentis (2020)	
Income		Blazquez (2020), Cifunetis (2020), Camoes (2020), Meyll & Pantis (2019)	
Degree	Du Caju (2015)	Bryan (2010)	Bryan (2010), Meyll & Pantis (2019)
Unempld.	Du Caju (2015) Gathergood (2012)		
Wealth	Camoes (2010)	Meyll & Pantis (2019)	
Retired	Bryan (DSR), Du Caju (DSR)	Bryan (arrears)	

Financial Literacy

Lusardi & Tufano (2015): difficulty in repaying associated with having less belief in own financial literacy and ability to do financial calculations

Angel (2015): arrears adjusted (to be close to EC definition) negatively related to financial literacy.

Meryll & Pantis (2019) same result as Angel.

Gathergood (2012) one month arrears: negatively related to fin lit. 3-month delinquency & heavy burden not related to financial literacy.

Impulsiveness

Gathergood (2012) 1 & 3 months arrears more likely for impulsive spenders.

Ottoviani & Vandone (2011)   impulsivity positively associated with having more unsecured debt but not more secured debt.

DSR: Arbitrary percentage as cut off.
.   Does not necessarily imply difficulty in repaying because may choose to allocate income to debt repayments.
     Proportion of income that is discretionary may increase with income.

Arrears: number of months is arbitrary and ignores wealth and income.

Perceived difficulty: subjective. May mean different things to different respondents.

Overall: D'Alessio argues fewer difficulties with perceived "repayment difficulty " than others and
is correlated more closely with other measures.

Econometric issues:

1. If interested in parameters of population model then need a representative sample not just a
sample of those with debt. Sample of only those with debt may result in sample selection bias.
All papers except Du Caju (2015) ignore this.

2. Many papers pool individuals/households with debt and those without. E.g. DSR: cannot distinguish between (a) those
that have debt and no difficulties from (b) those with no debt. Both have no difficulties but for different reasons.
Probability of being overindebted distribution is truncated but often this is not accounted for.

Contributions

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- Use sample selection models to account for MNAR nature of data generating process

- Explore effects of poor health

- Explore the effects of risk aversion

- Explore effects of discount rate

- Explore the effects of financial literacy

- Largest recent study for GB for over 12 years

Health Effects

Poor health can increase health expenditures and reduce income (transient or permanent).

No evidence on effects of health changes on overindebtedness.

But evidence suggests people suffering health shocks take more debt (Crook & Hochguertel 2011, Babiaritz 2013). Babiaritz found health shocks increase probability of having debt and the amount especially amongst households with low financial assets and without insurance.

Risk Aversion

No evidence on effect of risk aversion.

RA may increase discount rate, so may result in consumption being taken earlier facilitated by taking large amounts of debt.
But more risk averse people may take less debt because of greater sensitivity to chance a shock will prevent repayment.

Discount rate
May expect higher discount rate the more debt to be taken. Gathergood (2012) no evidence

Data

- Waves 4, 5, 6 and Round 7 of Wealth and Assets Survey (**EUL version**) - ONS

- Data collected at household and individual level

- Respondents lived in England, Wales & Scotland (south of the Caledonian Canal)

- Interviews in Waves, each covering 2 year period that changed coverage to be called Rounds:

  W1: July 2008-June2010,…., W5:July 2014-June 2016,

  R5: April 2014-March2016,……., R7: April 2018-March 2020.

- Longitudinal with additional randomly selected samples added in Waves 3, 4, 5 & R6

- Approx 18k household interviews and 34k individual interviews per wave.

- Respondents were aged 16+ and not in FT education.

- Wealthy are oversampled.

- No unique id for each household (person) across all waves.

Unique id can be created by "chaining" – using availability in each wave of the household # and person # in the current and previous wave.

- Changes between waves in

    - Names of variables (characters, character case)
    - Coding of variables
    - Availability of variables

- Clarity of filter conditions for certain questions

- Questions & variable names in Questionnaire but not in any versions of the data.
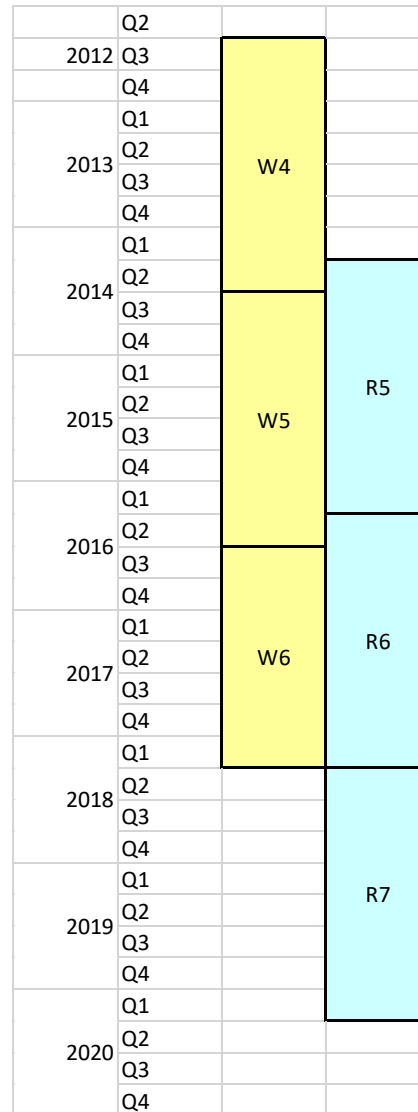
Measures of "Overindebtedness"

Burden

"Now thinking about the mortgage or loans secured on your property in addition to these payments, to what extent is keeping up with all of the repayments and interest payments a financial burden to your household?
A heavy burden/somewhat of a burden/ Or not a problem at all ?"

Missed 2

"Have you been able to keep up with the repayments for the instalments on [this catalogue/these catalogues] or are you 2 or more consecutive payments behind?

Debt service ratio (DSR) 30%

Computed as: If (total repayments / net income) > 30%

Questions on health, risk aversion, discount rate and financial literacy

Health

"How was your health in general. Would you say it was very good/good/fair/bad/very bad?"

"Do you have any long standing illness, disability or infirmity? By long standing I mean anything that has troubled you over a period of time or that is likely to affect you over a period of time? Y/N

Risk aversion

"If you had a choice between a guaranteed payment of one thousand pounds and a one in five chance of winning ten thousand pounds, which would you choose?"

Discount Rate

"If you had a choice of receiving a thousand pounds today and one thousand one hundred pounds in 12 months time, which would you choose?"

Financial Literacy

1. "If the inflation rate is 5% and the interest rate you get on your savings is 3%, will your savings have more, less or the same amount of buying power in a year's time?"

2. SHOWCARD: standard bank statement.
   "Looking at this example of a bank statement, please can you tell me how much money was kin the account at the end of February?"

3. "Suppose you put £100 into a savings account with a guaranteed interest rate of 2% per year. You don't make any further payments into this account and you don't withdraw any money. How much money would be in the account at the end of the first year, once the interest payment is made?"

Have a panel dataset relating to $i = 1, 2, \dots N$ cases for $t = 1, 2, \dots T$ periods (rounds).
We observe overindebtedness only if case has debt. We wish population parameters for the whole population.

Options

1. Ignore panel, selection mechanism, estimate cross sectional equation for data pooled over time.
2. Assume not interested in whole population – only those who have debt. (e.g.Random effects panel probit).
3. Address selection issue: Heckman type probit with sample selection equation.
4. As (3) but use panel estimatos (Semykina & Woolridge 2018).

Household Level: Mortgage and similar loans: Repayments are a heavy or somewhat heavy burden

Coefficients	RE Panel probit	Pooled with Selection
Variable	Coeff (se)	Coeff (se)
Age 16-24	0.330	0.034
Age 25-34	0.196**	-0.058
Age 35-44	0.387**	0.083
Age 45-54	0.305**	0.027
Single	-0.334**	-0.223**
Degree	-0.183*	-0.177**
Qual other	-0.145	-0.148**
Lives in flat	-0.174*	-0.007
Ln (hnetinc)	-0.434**	-0.361**
Reps/income	1.006**	0.844**
Ttl benefits	0.022**	0.026**
Time dummy	-0.122**	-0.069**

Has mortgage	RE Panel Probit	Pooled with Selection
Age 16-54		0.731**
House		0.392**
Married/cohabg		0.141**
Degree		0.153**
Qual other		0.138**
Num dep childn		0.169**
Employee		0.697**
Managerial/Profl		0.110**
Ln (hnetinc)		0.148**
Ln (Ttl Wealth)		0.091**
Ttl benefits		-0.048**
Time dummy		-0.047**
N	14,823	53,549
Selected		14,699
Not selected		38,850
Mean obs/gp	1.7	
Wald Chi2	383.1**	479.4**
Rho (e1,e2)		-0.257**
Rho	0.616**	

Household Level: Mortgages, cards, mail order, HP and loans (R6 & R7 only) Debt Service Ratio >30%

Corfficients	RE Panel probit with selection
Variable	Coeff (se)
Age 16-24	0.125
Age 25-34	0.606**
Age 35-44	0.911**
Age 45-54	0.647**
Single	-0.141**
Self empl	0.315**
Degree	0.496**
Qual other	0.462**
Lives in flat	-0.406**
hhnetinc	
Reps/income	
Ttl benefits	-0.083**
Ln (wealth)	-0.041**
Time dummy	-0.0156

Has mortgage or non-mortgage debt outstandg.	RE Panel Probit with Selection
Age 16-54	0.717**
House	0.309**
Married/cohabg	0.370**
Degree	0.576**
Qual other	0.497**
Num dep childn	0.156**
Employee	0.490**
Managerial/Profl	0.125**
Ln (net income)	0.448**
Ln (Ttl wealth)	-0.061**
Ttl benefits	-0.038**
Time dummy	0.120**
N	34,447
Selected	19,953
Not selected	14,494
Mean obs/gp	1.5
Wald Chi2	665.0**
Rho (e1,e2)	0.229
Rho	

Individual Level: Cards, mail order, HP and loans
Repayments are a heavy or somewhat heavy burden

Coefficients	RE Panel Probit with selection All rounds
Variable	Coeff (se)
Age 15-24	0.357 **
Age 25-34	0.699 **
Age 35-44	0.903**
Age 45-54	0.967**
Age 55-64	0.708**
Male	0.055*
Degree	-0.158**
Qual other	-0.095*
Has dep ch	0.380**
Single par	-0.313**
Unemployed	0.272**
Self emplyd.	0.052
Ln(net inc)	0.020
Total benefits	0.21×10^{-3}**
Reps/income	1.881**
Ln(wealth)	-0.380**
Disco rate	
Risk aversn.	-0.174**
Bad health	0.370**
Long stg ill	-0.150**
Single	
Divorced/widowed	
t	-0.070**

	RE Panel Probit with selection All rounds
Has debt	
Age 25-54	0.500**
Net inc	0.037**
Ttl benefits	-0.35×10^{-4}
Degree	1.095**
Qual other	0.684**
Has dep ch	0.257**
Ln (wealth)	0.321**
t	-0.203**
N	78,419
Selected	55,062
Not selected	23,357
Mean obs/gp	1.8
Wald Chi2	3656.8**
Rho (e1,e2)	0.055

Individual level: Cards, mail order, HP and loans
Missed two consecutive Payments

Coefficients	Cards, mail order, HP & Loans	Cards	MO, HP & Loans
	Pooled With selection	Pooled With selection	Pooled With selection
Variable	Coeff (se)	Coeff (se)	Coeff (se)
Age 15-24	0.467**	0.472*	0.674**
Age 25-34	0.412**	0.258	0.666*
Age 35-44	0.444**	0.351*	0.590*
Age 45-54	0.371**	0.246	0.543
Age 55-64	0.483**	0.376**	0.702**
Male	0.076	0.057	0.098
Degree	-0.028	-0.177	
Qual other	0.016	-0.100	
Has dep ch	-0.085	-0.084	-0.102
Single par	-0.242*	-0.316**	-0.172
Unemployed	0.237	0.318	0.165
Self emplyd.	-0.032	-0.037	0.031
Ln(net inc)	-0.063**	-0.040	-0.230**
Total benefits	0.31×10^{-3}**	0.30×10^{-3}**	0.34×10^{-3}**
Reps/income	0.585**	0.519**	0.317**
Ln(wealth)	-0.147**	-0.149**	-0.139**
Disco rate			
Risk aversn.	-0.033	-0.016	-0.048
Bad health	0.188**	0.186*	0.242*
Long stdg ill	-0.209**	-0.216**	-0.121
t	0.149**	-0.230**	-0.051

Has debt	Cards, mail order, HP & Loans	Cards	MO, HP & Loans
Age 25-54	0.430**	0.390**	0.402**
Net inc	0.63×10^{-2}**	0.53×10^{-2}**	0.68×10^{-2}**
Ttl benefits	0.99×10^{-4}**	0.42×10^{-4}**	0.82×10^{-4}**
Degree	0.364**	0.433**	0.196**
Qual other	0.349**	0.363**	0.269**
Has dep ch	0.183**	0.119**	0.192**
Ln (wealth)	0.055**	0.096**	-0.101**
t	0.214**	0.279**	0.034**
N	90,834	87,311	93,818
Selected	25,806	17,584	13,866
Not selected	65,028	69,747	79,952
Mean obs/gp			
Wald Chi2	565.3**	330.2**	192.8**
Rho (e1,e2)	-0.197	-0.232	-0.321
Rho			

Individual level: Cards, mail order, HP, and loans
Debt service ratio > 30%

	Pooled with selection
Variable	Coeff (se)
Age 15-24	-0.339**
Age 25-34	0.067
Age 35-44	0.230**
Age 45-54	0.232**
Age 55-64	0.142**
Male	-0.019
Degree	0.145**
Qual other	0.168**
Has dep ch.	0.189**
Single par.	0.166**
Unemployed	0.237**
Self empld.	0.214**
Ln(net inc)	
Total benefits	-0.45x10^{-3}**
Reps/income	
Ln(wealth)	-0.078**
Disco rate	0.227**
Risk aversn.	
Bad health	0.092*
Long stg ill	-0.106**
t	0.086**

Has debt	Pooled w seln
Age 25-54	0.174**
Male	-0.087**
Ln (net inc)	0.175**
Ttl benefits	-0.15x10^{-3}**
Degree	0.584**
Qual other	0.390**
Has dep ch	0.091**
Disco rate	-0.045**
Ln (wealth)	0.182**
Risk aversn.	0.084**
Bad health	-0.137**
Long stg ill	-0.028**
t	-0.095**
N	77,106
Selected	53,121
Not selected	23,985
Mean obs/gp	
Wald Chi2	1116.9**
Rho (e1,e2)	0.487**
Rho	

	Payments heavy burden	Missed 2 consec payts.	DSR 30%
	Probit with seln.	Probit with seln.	Probit with seln.
Variable	Coeff (se)	Coeff (se)	Coeff (se)
Age 15-24	0.227*	0.758**	-0.216
Age 25-34	0.429**	0.603*	-0.19×10^{-3}
Age 35-44	0.571**	0.616*	0.108
Age 45-54	0.617**	0.643*	0.168*
Age 55-64	0.455**	0.597**	0.134*
Male	0.016	0.182	0.074*
Degree	-0.141*	-0.034	-0.101
Qual other	-0.069	-0.049	-0.025
Has dep ch	0.296**	-0.132	0.218**
Single par	-0.333**	-0.247	0.238*
Unemployed	0.369**	0.275	0.134
Self emplyd.	0.057	-0.102	0.163**
Ln(net inc)	0.050**	-0.073	-0.214**
Total benefits	0.11×10^{-3}*	0.38×10^{-3}**	-0.35×10^{-3}**
Reps/income	1.51**	0.621**	
Ln(wealth)	-0.265**	-0.154**	-0.140**
Disco rate			0.246**
Risk aversn.	-0.158**	0.98×10^{-2}**	
Bad health	0.301**	0.225	0.160*
Long stg ill	-0.109**	-0.055	-0.070*
FL1: infln.	-0.037	-0.099	0.015
FL2: knkstat	-0.068	0.169	-0.033
FL3: intst	-0.093*	-0.040	-0.016

	Payts heavy burden	Missed 2 consec. payts	DSR 30%
Has debt			
Age 25-54	0.294**	0.376**	0.186**
Net inc[1]	0.032**	0.021**	0.178**
Ttl benefits	0.92×10^{-5}	-0.10×10^{-3}**	-0.14×10^{-3}**
Degree	0.574**	0.457**	0.509**
Qual other	0.378**	0.369**	0.332**
Has dep ch	0.136**	0.170**	0.099**
Ln (wealth)	0.171**	0.073**	0.172**
FL1: infln	0.096**	0.044	0.101**
FL2: bnkstat	0.245**	0.178**	0.215**
FL3: intst	0.110**	0.058*	0.124**
N	25,529	24,464	25,085
Selected	17472	9,987	16,878
Not selected	8057	14,477	8,207
Mean obs/gp			
Wald Chi2	2686.6**	146.6**	885.5**
Rho (e1,e2)	0.075	-0.019	-0.558**

Changes in overindebtedness

Transition matrix of possible values of changes in overindebtedness indicator (Δy_{it})

State in t+1

	Not Overindebted (0)	Overindebted (1)
Not Overindebted (0)	0	+1
Overindebted (1)	-1	0

State in t

If in round t , i is not overindebted ($y_{it} = 0$) she can either stay in that state ($\Delta y_{it} = 0$) or transit into being overindebted ($\Delta y_{it} = +1$)

Model one state changes as:

$$\Pr(\Delta y_{it} = 1 \mid y_{it-1} = 0) = \Phi(\mathbf{x}_{it}^T \boldsymbol{\beta})$$

$$\Pr(\Delta y_{it} = -1 \mid y_{it-1} = 1) = \Phi(\mathbf{x}_{it}^T \boldsymbol{\beta})$$

Results for Heavy burden
Average marginal effects

Cards, mail order, HP, loans. Conditional on holding debt.

Variable	Transition	AME
Age 15-24	Into	0.0078
	Out of	-0.1512
Age 25-34	Into	0.0530**
	Out of	-0.1355**
Age 35-44	Into	0.0594**
	Out of	-0.1616**
Age 45-54	Into	0.0503**
	Out of	-0.2061**
Age 55-64	Into	0.0411**
	Out of	-0.0180**
Male	Into	0.0059
	Out of	-0.0420**
Single	Into	0.0155*
	Out of	-0.1035**
Divorced/separtd	Into	0.0496**
	Out of	-0.1346**
Degree	Into	-0.0151
	Out of	0.22×10^{-3}
Qual other	Into	-0.0026
	Out of	0.0045
Has dep ch	Into	0.0537**
	Out of	-0.0821**
Single par	Into	-0.0091
	Out of	-0.0438
Unemployed	Into	0.0299
	Out of	-0.0543
Self emplyd.	Into	0.0101
	Out of	0.0117
Ln(net inc)	Into	0.0077**
	Out of	-0.0068

Variable	Transition	AME
Total benefits	Into	-0.98×10^{-6}
	Out of	-0.95×10^{-4}**
Reps/income	Into	0.1633**
	Out of	-0.4740**
Ln(wealth)	Into	-0.0288**
	Out of	0.0475**
Disco rate	Into	0.0306**
	Out of	-0.0534**
Risk aversn.	Into	-0.0167**
	Out of	0.0632**
Bad health	Into	0.0310**
	Out of	-0.0016
Long stg ill	Into	-0.0367*
	Out of	
t	Into	0.0056
	Out of	-0.0064
N	Into	16,680
	Out of	4,048
Wald (Chi sq)	Into	1258.7**
	Out of	452.1**
Pseudo R2	Into	0.1652
	Out of	0.1168

Conclusions

- Re need for selection model: depends on the level of aggregation and dependent variable:

  Household level: Correlation of errors in selection model generally significant
  Individual level: Burden of repayments and missed 2 payments - correlation not significant
                      DSR30 – correlation is significant.

- In general: more education, higher income, more wealth, being single **reduces** chance of being overindebted
  receiving more in benefits is associated with **greater** chance of being indebted.

- Poor general health increases chances of being overindebted and of becoming overindebted.
  Poor long term health associated with lower chance of being overindebted and of becoming overindebted.

- Higher discount rate (more impetuous) associated with high DSR and with DSR increasing.

- Risk aversion associated with lower chance of being overindebted and with lower chance of becoming overindebted

- Rarely find financial literacy is (conditionally) associated with any measure of overindebtedness.
  But financial literacy is very strongly associated with having debt.

Thank You

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