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The Wellbeing Effects of Debt and Debt-Related Factors

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Disclaimer

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Table of Contents

Executive Summary

This report estimates and monetises the impact of debt on subjective wellbeing for potential use in cost-benefit analysis for FCA market interventions.

We derive estimates of how subjective wellbeing changes with total debt, debt split by product cost, debt held in specific credit products, and arrear-debt. We look at whether indebtedness from past time periods continues to affect current wellbeing. Finally, we investigate whether the impacts of debt on wellbeing are felt more severely among vulnerable individuals. Many of these research questions remain largely unanswered by the literature to date.

We use the four most recent waves of the Wealth and Assets Survey, a longitudinal dataset representative of Great Britain, covering the period from 2010 to 2018.

We find that being in arrears on debt payments has a large detrimental impact on subjective wellbeing. We also find evidence that such impact is particularly acute among the unemployed. Similarly, total arrear-debt is strongly associated with lower levels of wellbeing. We argue that these estimates are less affected by causality threats than non-arrear-debt. In particular, while an increase in non-arrear debt may be associated with acquiring wellbeing-enhancing goods or services, an increase in arrear-debt is not associated with the availability of expendable financial resources.

The effect of non-arrear debt varies according to credit product and definition. When splitting credit products by their cost of servicing, we find that high-cost debt is associated with lower levels of wellbeing. This effect is magnified for individuals who are economically inactive. Among the products which may be driving the relationship, current account overdrafts stand out.

We monetise the estimates of the effect of total arrear-debt on wellbeing – that is, we convert impacts expressed in life satisfaction points to monetary values – through the Three-Stage Wellbeing Valuation method, which is listed as an accepted method for use in the HM Treasury Green Book. We then apply the resulting wellbeing value to an existing FCA cost-benefit analysis as an example. By doing so, we aim to showcase the implication of accounting for wellbeing impacts in benefit-cost ratios and wider value-for-money analysis. We demonstrate that wellbeing improvements can make up a material proportion of the benefits of interventions which reduce arrear indebtedness.

1 Introduction

Empirical research in the field of subjective wellbeing (SWB) has seen substantial growth over the last two decades. Alongside advances in the literature, policymakers are increasingly realising the importance of capturing wellbeing impacts holistically in appraisal and evaluation.

Much of the SWB[1] literature seeks to estimate the impact that specific personal characteristics or circumstances – such as ill health – have on wellbeing, while other work has sought to define the link between SWB and financial resources. Of the latter studies, much of the attention has been devoted to understanding the role of income in a person's wellbeing, where the literature has reached somewhat established conclusions.[2] Evidence on the impacts of debt (and arrears) on individuals' wellbeing is emerging but is still insufficient for consensus to be reached.

This report estimates the relationship between wellbeing and various measures of debt using the Wealth and Assets Survey, a large-sample longitudinal dataset representative of Great Britain, in a fixed-effects linear regression setting. We explore several research questions on the relationship between SWB and indebtedness – specifically:

- Does total debt influence wellbeing? If so, to what extent?
- Are wellbeing impacts dependent upon the cost of the credit product held?
- What is the effect on wellbeing of being in arrears with debt payments?
- Is the effect of arrear-debt different to the effect of non-arrear-debt?
- Do past levels of indebtedness continue to affect present SWB?
- Is the burden of indebtedness felt more strongly among vulnerable groups?

Our main finding is that being in arrears is statistically significantly associated with a large decrease in SWB. We find evidence that this effect may be larger if individuals in arrears are also unemployed. Increases in total arrear-debt is also strongly and significantly associated with lower levels of SWB. Finally, non-arrear debt held in high-cost credit products – especially in the form of current account overdrafts – is negatively and statistically significantly associated with wellbeing. The association between aggregate debt and SWB is less clear, and we discuss likely caveats.

Where specific categories of debt are found to affect individuals' wellbeing, policy interventions which alter the level and status of indebtedness in such categories may wish to account for the resulting wellbeing costs and benefits. We apply our findings to an example

[1] We henceforth use the terms subjective wellbeing (SWB) and wellbeing interchangeably.

[2] There is evidence of a robust statistical association between SWB and income both in cross-sectional and panel data, after controlling for omitted variables (Tay et al., 2018). Gardner & Oswald (2006) and Fujiwara (2013) argue that the relationship is causal.

cost-benefit analysis and demonstrate that the inclusion of wellbeing impacts can help provide a more holistic view of consumer benefits resulting from policy interventions.

The report is structured as follows: Section 2 summarises the SWB-debt literature to date; Section 3 describes the data and the research methodology; Section 4 presents and discusses the results; Section 5 monetises the coefficient on arrear-debt using the Three-Stage Wellbeing Valuation method and applies the resulting wellbeing values to an example cost-benefit analysis application; Section 6 concludes.

2 Review of existing literature

Though empirical evidence of the relationship between debt and subjective wellbeing has grown substantially over the last two decades, it is still relatively limited. While the effect of income on SWB has received much attention, literature examining the effect of debt (and wealth) is still somewhat scarce.

A recent systematic review by Tay et al. (2016) finds that 90% of studies in the literature[3] found at least one statistically significant negative association between debt and SWB. However, the existing evidence base rarely accounts for issues in identifying causality. Also, studies differ across a wide range of characteristics, such as the adopted measure of wellbeing, the subjective or objective definition or measure of indebtedness, the type and severity of debt, and empirical approach.

2.1 Measures of wellbeing and debt

The measure of wellbeing adopted in this study is life satisfaction. Along with measures of happiness, anxiety, and sense of a worthwhile life, life satisfaction is one of the 'accepted and trusted measures of (subjective) well-being'[4] developed by the Office for National Statistics (ONS) as part of the Measuring National Well-being Programme. It measures the evaluative aspect of subjective wellbeing and is a 'cognitive assessment of how (respondents) feel life is going overall'[5,6] Of the four measures typically included in ONS datasets, it is argued that life satisfaction is the closest empirical approximation of individual utility, and has thus been preferred in studies using the Three-Stage Wellbeing Valuation method (or a variant thereof) to monetise non-market goods and services[7]. Model replication using other measures of wellbeing such as happiness and anxiety would provide useful additional descriptive insights.

The majority of the literature, which is not focussed on monetising results, uses different measures of SWB, such as depression, exhaustion and sadness (Adams and Moore, 2007; Krause et al., 1991), anxiety (Drentea, 2000), anger (Drentea and Reynolds, 2012), stress (Norvilitis et al. 2003) or composite health indicators (Brown et al., 2005; Gathergood, 2012). However, several studies have used life satisfaction as their definition of wellbeing (Norvilitis et al., 2003; West et al., 2011; Han and Hong, 2011; Brown and Gray, 2016; Clark et al., 2020; Xiao et al., 2019; and Hochman et al., 2019).

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[3] We here refer to the published literature on the relationship between debt and wellbeing. All cited research is based on samples from developed countries and the majority are non-UK samples.

[4] See the ONS Personal well-being user guidance.

[5] See the ONS Personal well-being frequently asked questions.

[6] See Tinkler and Hicks (2011) for an in-depth discussion on measuring subjective well-being.

[7] This report follows the approach to monetise non-market goods and services using life satisfaction data set out in Fujiwara (2013). Other authors following similarly motivated approaches include Ambrey & Fleming (2013) for public greenspace, Fereira & Moro (2010) for air quality and Howley (2017) for a range of health conditions.

An important differentiator in the evidence base is the distinction between subjective and objective measures of debt. While both are usually self-reported, subjective debt measures rely on questions asking the respondent about the level of burden, concern, stress, or difficulty in keeping up with debt obligations. Objective debt measures determine the debt status of respondents and the totals of outstanding debts.

Tay et al. (2016) argue that objective debt impacts SWB via the subjective debt burden as it is respondents' own assessments of their financial wellbeing which matter for their conception of their overall wellbeing, proxied by life satisfaction. The decrease in overall SWB following indebtedness may also stem from multiplier effects as indebtedness can affect other life domains, such as health. Our analysis makes use of self-reported objective measures of indebtedness to estimate their impact on wellbeing as they are more readily usable in a cost-benefit analysis framework.

2.2 Study design (cross-sectional versus longitudinal)

The majority of empirical studies making up the literature are cross-sectional, the few exceptions being the longitudinal studies by Dew and Yorgason (2010), Gathergood (2012), Brown and Gray (2016) and, more recently, Clark et al. (2020) and Hochman et al. (2019). Most studies therefore do not account for unobserved individual fixed-effects as a source of omitted variable bias[8]. Gathergood (2012) finds that estimates of the impacts of problem debt on psychological health fall by approximately two-thirds with the inclusion of fixed-effects.

In their systematic review, Tay et al. (2016) found that among empirical cross-sectional studies, 85% of reported associations display at least one statistically significant association between debt and lowered SWB.

Among longitudinal studies with representative samples, Gathergood (2012) and Clark et al. (2020) found subjective debt levels to significantly reduce psychological health and SWB, respectively. Brown and Gray (2016) find that total debt significantly worsens life satisfaction, while controlling extensively for overall financial resources in a fixed-effects model on a large Australian sample. More recently, Hochman et al. (2019), using a random-effects model on German data, find negative net-worth to significantly reduce SWB.

2.3 SWB and classes of debt

The literature has also explored associations between SWB and different types of debt. Some types of debt – such as mortgage debt – may serve to acquire goods and services which are

[8] Further to this point, most studies are based on small sample sizes, and few are representative of the general population. With many studies in the literature being restricted to subsets of the population such as students, soldiers and retirement-age adults, those which to our knowledge are representative of the general population are Gathergood (2012, UK), Brown and Gray (2016, Australia), Gathergood and Guttman-Kenney (2016, UK), Clark et al. (2020, Australia), Xiao et al. (2019, China) and Hochman et al. (2019, Germany).

wellbeing-enhancing, or may be instrumental to achieving other personal and business goals. In such cases the statistical association between debt and wellbeing may be positive if the means through which the resources are enjoyed are not controlled for comprehensively[9]. Indeed, Brown et al. (2005) and Brown and Gray (2016) find that non-mortgage debt statistically significantly decreases SWB, but that mortgage debt does not. Xiao et al. (2019) find that both mortgage debt and non-mortgage debt have a negative effect on SWB but that the effect is greater for non-mortgage debt.

Some studies have instead focused on the type of lender, as wellbeing impacts may depend on conditions specific to certain debt contracts. Bell et al. (2014) finds credit card debt, and debt from loans on vehicles, to decrease SWB. However, a cross-sectional design and insufficient controls for asset ownership mean we are less confident of the causal nature of their findings. Tay et al. (2016) find that financial assistance from relatives causes a less pronounced decrease in SWB than loans from banks.

2.4 Modelling objective debt

Studies making up the literature have modelled the SWB-debt relationship in several ways. Among the studies which examine the effect of objective debt on SWB, most regression specifications use the absolute amount of debt owed, with some defining debt on discrete ranges or as a dummy variable for whether any debt is owed. Hochman et al. (2019) find that negative net-worth is negatively associated with SWB. Some studies define a measure of debt relative to income or wealth. Drentea (2000) found the credit card debt-to-income (DTI) ratio to be positively associated with negative feelings, while credit card debt alone was not.[10] [11] Brown and Gray (2016) find that total debt significantly reduces life satisfaction when debt is expressed logarithmically. Bell at al. (2014) find that credit card debt has a negative effect on SWB only for debt levels greater than $2500.

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[9] The “isolated effect” of debt on SWB, if one managed to control for all channels through which debt may serve to increase SWB, would be expected to be negative. We therefore interpret a positive coefficient as a failure to exhaustively control for all such channels. Following the same reasoning, a negative overall statistical association between debt and SWB without adequate controls may hide an isolated SWB-debt relationship of even larger magnitude.

[10] Similarly, Gathergood and Guttman-Kenney (2016) use the DTI ratio, the numerator being consumer credit debt, to analyse the association between debt and financial distress (defined in multiple ways, among which being in arrears), and find that the DTI ratio has a much stronger correlation with financial distress than the total outstanding value of debt, controlling for income.

[11] Defining a measure of debt relative to wealth or income directly accounts for the serviceability of debt. Regardless of whether the SWB-debt relationship is modelled relative to wealth or income, the full set of individuals’ financial liabilities, and their financial and physical wealth must be exhaustively controlled for as the effect of debt on SWB depends on an individual’s overall financial position and their ability to service debt obligations. It seems likely that data limitations may have been an inhibiting factor to date in many studies in fully controlling for total liabilities and total wealth. Brown and Gray (2016) provide possibly the most convincing evidence to date, given that they control for total assets and total debt, as well as for individual fixed effects.

2.5 Debt delinquency and arrears

Hogan et al. (2013) find that debt delinquency is positively associated with negative feelings but did not find the same for regular credit card balance. Similarly, Drentea (2000) found that defaults were positively associated with negative feelings, while credit card debt alone was not. Gathergood and Guttman-Kenney (2016) study the association between being in arrears (an indicator of severe financial distress) and wellbeing, and find that individuals in arrears experience a lower level of wellbeing than those with outstanding consumer credit debts but who are not in arrears.

2.6 Dynamics of the SWB-debt relationship

Clark et al. (2020) make an important contribution to the literature by looking at the intertemporal dynamics of the relationship between life satisfaction and changes in household net worth. They show that contemporaneous changes in net worth have a significant effect on wellbeing, and that past financial events also continue to affect current wellbeing, though the magnitude of these reduces over time, providing evidence of adaptation to financial shocks. Conversely, Brown and Gray (2016) find that changes in total debt do not significantly impact life satisfaction in the next time period.

2.7 Heterogeneous effects

Little work has sought to comprehend the extent to which the adverse effects of debt may be felt differently among vulnerable subgroups. Tay et al. (2016) find that household income significantly changes the way in which financial worry affects life satisfaction. Hochman et al. (2019) find that being unemployed does not alter the impact of debt on SWB versus being employed. Clark et al. (2020) find that SWB impacts are heterogeneous over the distribution of wellbeing, with people at the lower end of the wellbeing distribution being more adversely affected by financial losses.

2.8 Wider context

When put in the context of the existing literature, the contribution of this study is to provide evidence from exploiting a large and rich nationally representative sample spanning eight years, which allows us to investigate the effect that multiple debt types and sources have on SWB while controlling for *(i)* unobserved time-invariant variables and *(ii)* respondents' overall financial situations. We consider objective debt, and we look for a reliable estimate of the effect that a unit of debt has on SWB. Furthermore, we explore whether this effect: is sensitive to holding a particular credit product; differs for delinquent debt; persists over time; is experienced to a greater or a lesser extent by specific subgroups of the population.

3 Data and methodology

3.1 Data

The analysis uses data from the Wealth and Assets Survey (WAS), a biennial longitudinal survey conducted by the Office of National Statistics (ONS) that is representative of Great Britain.[12] The longitudinal nature of the dataset allows us to explore how changes in indebtedness are associated with changes in SWB over time within individuals. The ONS4 measures of personal well-being were included in WAS from wave 3 onwards.[13] As such, our analysis uses four waves of data[14] covering an eight-year period from 2010 to 2018.[15]

Our main dependent variable and proxy for subjective wellbeing is life satisfaction, measured on a 0-10 scale and selected for use in the Three-Stage Wellbeing Valuation method.

WAS collects data on a large number of credit products (see Table 1), which we aggregate to household level.[16]

The data allows us to separate the arrears[17] component of debt from the non-arrears component for the majority of products in the data.[18] To assess whether the impact of the arrears component of a given product behaves differently to its non-arrear component, we replicate the analysis where both components sit in the same variable by extracting the arrears component and placing it into a *total arrears* variable.[19]

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[12] More information about WAS can be found here. Gathergood and Guttman-Kenney (2016, pp. 46-51) also provide an overview of WAS.
[13] The ONS4 wellbeing questions asked to respondents focus on (1) life satisfaction, (2) having a worthwhile life, (3) happiness, and (4) anxiety.

[14] The periodicity of the survey has changed from “waves” (July to June) to “rounds” (April to March) during wave 5, so that both “wave” and “round” 5 are available in the data store. We use wave 5 and remove duplicates in the second quarter of 2016 between wave 5 and round 6.
[15] Specifications that use lagged independent variables use wave 2 data as well. Wave 1 was excluded as most debt variables were defined in a way that was inconsistent with those in later waves.
[16] Most variables used in the analysis provided in the WAS derived-variables catalogue are already aggregated at household level. This is not the case for individual loans, for which we compute outstanding amounts of debt using information from responses on type of loan, monthly repayment and years and months prior to full repayment, and aggregate these at household level.
[17] Arrears are defined as the amount owed on 2 or more consecutive missed and overdue repayments at the time of responding to the survey.
[18] The exceptions, for different and in some cases obvious reasons, are credit/store/charge cards, current account overdrafts, student loans, loans from employers, loans from family and friends and household bill arrears.
[19] Therefore, in specifications where debt categories do not distinguish the two components, the arrears component of mortgage debt sits in the broad “mortgage debt” variable along with the non-arrears component of mortgage debt; in specifications where debt categories distinguish the two components, the “mortgage debt” variable will only contain its non-arrear component, while its arrear component will be in the "total arrears" variable along with the arrear components of all other debt variables (out of concern about sample sizes).

The data contains a majority of the control variables discussed in the wellbeing literature.[20] These include self-reported health status, educational attainment, marital status, household size, number of dependent children, household income, employment status, age group and region.

In addition to these standard controls, wealth and asset ownership are important in this application. We control for measures of household net financial wealth, household net property wealth, household physical wealth and household (gross regular) income. It is crucial both to control for these variables and that they are aggregated at household level, as we assert that the ability to service debt – and cope with the stress of indebtedness – depends on the availability of resources and the amount of assets held across the whole household.[21] Other controls for asset ownership include dummies for residence status, the number of homes owned, and the number of vehicles owned.

A distinct difficulty in identifying the effect of indebtedness on SWB is controlling exhaustively for all the goods and services that credit products facilitate access to. Indebtedness is typically associated with a dual effect on SWB. The first effect is the stress effect of having to meet debt obligations and is expected to be negative. The second is the effect that enjoyment or satisfaction has on wellbeing following the use of the resources made available through the credit product, expected to be positive. The effect of debt on SWB picked up if one fails to control for the uses of debt can be positive if the latter effect outweighs the former. Given our set of controls, we manage to isolate the effect of debt on SWB when the newly available resources are used to buy a house, car, or a valuable item such as a painting (reported in physical wealth). We instead pick up the overall effect of debt – inclusive of SWB-enhancing uses of debt – if the resources are instead used to acquire an unobserved good or service - such as a family holiday.[22] As we discuss later, we are less concerned with omitted variable bias when we analyse the effect of arrear-debt, as it is not necessarily paired with an increase in available resources.

Table 1 provides descriptive statistics for the dependent and main independent variables for the pooled sample (waves 3 to 5 and round 6 of WAS).

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[20] Dolan (2008) lists the main determinants of SWB.

[21] We cannot exclude that our sample may include a number of individuals who formally make up the same household but who are not financially integrated, such as individuals in shared rental accommodations. In these cases the assumed relationship between an individual's wellbeing and the financial position of the entire household may not hold. As of 2019, households made up of two or more unrelated individuals who are not in a relationship make up 2.8% of all households, so this likely affects only a small sample of individuals in the WAS.

[22] Ideally, one would want to control for exactly what the borrowed resources allow an individual to do or buy. This is probably too cumbersome for any survey to do. For example, when a person has taken out a loan to finance an extension to her house, we would need to know not only this simple fact, but also whether the expected increase in the value of the house is factored into her response on the value of her house (net property wealth). A second ideal (and fictitious) identification strategy would be to allocate debt randomly in an RCT and prevent borrowers from making any use of amounts borrowed, clearly compounding the ethical problems of applying an RCT to the study of the wellbeing impacts of debt.

Table 1: Pooled descriptive statistics for the dependent variable and main independent variables

Variables	Mean	Standard Deviation
Life satisfaction (0-10)*	7.54	1.8
Total debt (£)	44,079.31	113,000
Total arrears (£)	60.15	3,307.12
Whether in arrears (%)	4.1%	.197
Mortgage debt (£)*	40,406.95	111,000
High-Cost debt:		
Debt from mail order accounts (£)*	29.54	410.67
Current account overdraft debt (£)*	168.46	2,105.95
Debt from cash loans collected at home (£)	13.86	505.49
Debt from payday loans (£)	3.61	314.53
Debt from loans from pawnbrokers and cash converters (£)	.16	12.75
Standard-Cost debt:		
Debt from credit / store / charge cards (£)*	834.32	2,982.24
Debt from personal loans (£)	837.22	5,888.74
Debt from hire purchase agreements (£)*	787.51	3,947.25
Debt from loans from credit unions (£)	10	960.92
Other debt:		

Debt from loans from family, friends and / or relatives (£)	51	1,153.68
Debt from loans from employers (£)	3.47	134.48
Debt from loans from the Student Loans Company (£)*	707.39	4837.40
Debt from other student loans (£)*	124.50	1,902.81
Household bill arrears (£)*	33.79	498.69
Debt from loans from the Social Fund (£)	4.27	581.11
Debt from other loans (£)	63.66	1,921.26

Notes: (source: Wealth and Assets Survey) All debt variables are aggregated at household level. Total arrears is the sum of mortgage arrears, mail order arrears, arrears on hire purchases, arrears on all formal loans and household bill arrears (all of which are provided by WAS). A respondent is coded as being in arrears if total arrears is positive and / or if they have arrears on their credit / store / charge card (for which a respondent is asked whether they are in arrears but is not asked the amount). High-cost debt and Standard-cost debt are aggregated as suggested in FCA OP 53 Belgibayeva et al (2019) *and* Feedback Statement FS 17/2: High-cost credit and review of high-cost short-term credit price cap (FCA, 2017). *All variables include arrears if the arrear component for the given credit product exists. Averages include zeros for individuals who do not hold a given credit product. Variables marked with an asterisk are provided by WAS and are already aggregated at household level. Amounts of individual loans (necessary to split debt into "high" and "standard" cost and not provided by the WAS dataset) are computed from information from responses on type of loan, monthly repayment, years and months prior to full repayment, amount of arrears, and are then aggregated at household level. The starting sample is 191,812. 95,516 observations had missing data on life satisfaction. Of these: 30,122 were individuals aged under 16; 230 responded they "did not know"; 45 refused to answer; the rest consist of individuals who did not repeat the follow-up interview in person. Outliers are not removed as WAS already applies a systematic approach to identify and amend outliers where necessary. The final estimation sample with non-missing data is 96,296.*

3.2 Econometric model

Our chosen estimation strategy is fixed-effects linear regression.[23] This allows us to control for time-invariant unobservables which may be correlated with both debt and subjective wellbeing.

In addition to accounting for individual fixed-effects, we also include region dummies, year dummies, and region-year interactions. In this way we are able to control for unobservables which are constant over time but which vary across individuals (such as personality traits) and unobservables which are constant across individuals but which are time-variant at a country-wide level (macro trends) or at a regional level (such as local trends in house prices, crime rates or labour market conditions).

Following Brown and Gray (2016), we apply the (natural) logarithmic functional form for continuous debt variables, net financial and property wealth, physical wealth, and income.[24]

The starting point of our analysis is given by the following model:

$$LS_{it} = \beta\, ln\,(Debt_{it}) + \alpha_i + \tau_t + \theta_{rt} + other\ factors + u_{it} \qquad \text{(Eq.1)}$$

for $i = 1, \ldots, N$ and $t = 1, \ldots, T$.

In Equation 1, *LS* is life satisfaction; *Debt* is the main independent variable (or variables, where debt is split into multiple categories or types) and its definition changes across models;[25] α are individual fixed-effects; τ are year fixed-effects; θ are year-region fixed effects; *other factors* are the set of (log) wealth, (log) income, ownership, socio-economic and demographic controls listed in the notes in Table 2; and *u* is the error term. β is the coefficient of interest.

There are three key threats to causality from estimating our models using Equation 1.

The first, discussed in Section 3.1, is omitted variable bias, stemming principally from two sources. A first source is that it is difficult to control for all the wellbeing-enhancing uses of debt. To the extent that resources made available through specific credit products are associated with different spending behaviours and purchases of a different set of goods and services, some of which we are able to control for while for others we are not, coefficients across credit products may not necessarily be directly comparable. We are more concerned about this source of bias for some categories of debt than we are for others. In particular, we

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[23] As is often the case when estimating causal relationships, the ideal scenario of running a randomized controlled trial (RCT) – whereby participants would randomly be allocated debt – runs into practical and ethical considerations which render it unfeasible. Satisfactory natural experiments are also hard to come by, as an event (or instrument) that alters individuals' indebtedness status invariably affects their SWB through other means.

[24] Where values of a monetary variable (*var*) are non-negative, we specify ln(*var*+1). Where values are negative (such as for net financial and property wealth), we specify -ln(|*var*|).

[25] The logarithmic form for debt variables clearly holds where debt is defined on a continuous scale.

believe this is less of a concern for arrear-debt, which is not necessarily associated with the availability of new financial resources the expenditure of which can increase wellbeing. A second source of omitted variable bias could be the occurrence of certain negative life events which affect both debt levels and SWB, and that we cannot completely control for.[26]

The second threat to causality is measurement error. If, for example, individuals with lower wellbeing over-report the extent of their indebtedness, the resulting estimates could be biased.[27] Brown et al (2015) find that lender-reported and borrower-reported levels of debt do not differ systematically in aggregate[28], but we cannot rule out that measurement error may be correlated with SWB.

The third is reverse causality. We cannot rule out that a reduction in wellbeing over time causes individuals to increase their debt levels. We do not think that this would prevail to a large enough extent so as to substantially bias our estimates. Measurement error and reverse causality are, we believe, more of a concern when debt is measured subjectively.[29]

To the base specification in Equation 1 we make several additions throughout the analysis.

Firstly, we look at whether individuals adapt to indebtedness from previous time-periods, by augmenting Equation 1 with two lags on the indebtedness variable of interest.

Secondly, we explore whether the effect of a given debt category or type is heterogeneous across different potentially vulnerable subgroups of the population.

Lastly, we are interested in investigating the impacts of a given sequence in the timings of being unemployed and arrears status in past time-periods. Specifically, we look at whether current wellbeing is associated with experiencing a period of unemployment following falling into arrears and, vice versa, whether it is associated with falling into arrears following a period of unemployment.

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[26] While we control for certain life events such as unemployment, divorce, and changes in health status, we cannot control exhaustively for all events that may affect both SWB and debt.

[27] Gathergood and Guttman-Kenney (2016, pp. 46-47) summarises the advantages and disadvantages of using survey data instead of administrative data in a similar application.

[28] The exceptions are credit card debt and student debt.

[29] We also conduct a strict exogeneity test on our models, by augmenting them with leads of the independent variables of interest. The coefficients on the leads are not individually nor jointly statistically significantly different from zero, with p-values from the F-test being in the range of 0.3-0.6. We therefore have no evidence suggesting that covariates are not strictly exogenous.

3.3 Three-Stage Wellbeing Valuation

To monetise our econometric estimates for use in cost-benefit analysis, we use the Three Stage Wellbeing Valuation method as set out in Fujiwara (2013), consistent with HM Treasury's Green Book guidelines to monetise non-market goods and services.[30]

The three stages of the approach applied to the present application are broadly as follows:

1. Derivation of a causal estimate of the impact of income on life satisfaction. We use the income coefficient derived in Fujiwara (2013) which uses an instrumental variable approach.[31]
2. Estimation of a multivariate regression, controlling for the key determinants of subjective wellbeing as well as any domain-relevant controls, to derive the impact of debt and debt-related factors on life satisfaction.
3. Calculation of the compensating surplus - using estimates from steps 1 and 2 – consisting of the amount of money that leaves an individual at their initial level of wellbeing following a change in debt.

Section 5 provides a full discussion of how the Three-Stage Wellbeing Valuation approach can be applied to the present application.

[30] Among published research which makes use of the Three-Stage Wellbeing Valuation method are Lawton et al. (2020) and Dolan et al. (2019). Dolan & Fujiwara (2016) provide a complete theoretical overview of the method.
[31] Other research which has sought to estimate the effect of income on life satisfaction includes Deaton (2008) and Pischke (2011).

4 Results

4.1 Indebtedness

Table 2, column (1) presents the results from estimating Equation 1 using total debt as the debt variable of interest[32]. Aggregate debt does not appear to have a significant influence on subjective wellbeing.[33] [34]

The positive sign of the coefficient – though small in magnitude and statistically insignificant – could indicate that we are not controlling for some important omitted variables. The resulting coefficient includes any satisfaction which may be gained through the purchase of any good or service that is not an asset, house or vehicle, that is unreported under physical wealth, or that does not lead to a change in other demographic or socio-economic controls.

Controlling for current total indebtedness, it seems that past indebtedness has a similarly ambiguous effect on current wellbeing (Column 2). Indeed, if we fail to see a strong contemporaneous effect of overall debt, we would not expect the effect of indebtedness from previous time periods to be any stronger – conditional on present indebtedness.[35] In this regard our findings are consistent with those of Brown and Gray (2016).

Model 4 regresses life satisfaction on a set of three dummy variables for belonging to the second, third and fourth quartile in the total debt distribution.[36] This model provides us with no evidence that taking on greater levels of (total) debt decreases wellbeing. The positive and significant coefficient on the fourth total debt quartile likely picks up the wellbeing-enhancing effects of acquiring large assets. In a fixed effects framework, moving from a lower quartile to the highest quartile represents a substantial increase in debt consistent, for example, with acquiring property using mortgage. This result is in line with the impact of mortgage debt in Table 3.

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[32] The interpretation of a linear-log model is (approximately) that a 1% increase in the independent variable is associated with a β/100 increase in the dependent variable. For instance, according to the coefficient on high-cost debt in Model 5 (-0.0207), a 10% increase in high-cost debt decreases life satisfaction by 0.002 points on a 0 to 10 scale.

[33] We also explored the association between SWB and the debt-to-income ratio (DTI) and debt as a fraction of wealth. We find that the coefficient on neither is statistically different from zero at any conventional significance level.

[34] Following many examples in the literature, we also regress life satisfaction on total household financial liabilities (that is, total debt excluding mortgage debt, or "unsecured debt") alongside mortgage debt ("secured debt"). We find that the coefficient on (log) total household financial liabilities is .00004 and not statistically significantly different from zero.

[35] Column 3 replicates Model 1 with the same sample as Model 2.

[36] Belonging to the first total debt quartile is therefore the reference case.

Table 2: The effect of total debt on SWB.

Dependent variable: life satisfaction (0-10)	Parametric			Nonparametric
	(1)	(2)	(3)	(4)
ln(Total Debt)it	0.00218 (0.00237)	0.00201 (0.00351)	0.00245 (0.00339)	
ln(Total Debt)$it-1$		-0.00222 (0.00351)		
ln(Total Debt)$it-2$		0.000937 (0.00344)		
Debt quartile = 2 it				-0.0306 (0.0207)
Debt quartile = 3 it				0.0310 (0.0259)
Debt quartile = 4 it				0.0977*** (0.0375)
Observations	*96,076*	*45,443*	*45,443*	*96,076*
Individuals	*49,343*	*24,131*	*24,131*	*49,343*

*Notes: (source: Wealth and Assets Survey) Standard errors clustered at individual level in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All debt variables are aggregated at household level. In Specification 4, the first debt quartile is the reference case. Controls include: (log) net household financial wealth, (log) net household property wealth, (log) physical wealth, (log) household gross regular income, house ownership status (owned outright/ buying with mortgage/ part rent part mortgage/ rent it/ rent-free/ squatting), number of vehicles owned, number of homes, household size, legal marital status (single/ married/ civil partnership/ separated/ divorced/ widowed/ civil partner separated), number of children in household, age group (6 categories), education level (4 levels), GOR, employment status (employed, unemployed, inactive) and general health (5 levels). All regressions include individual, year, and region-year fixed effects.*

Table 3 presents estimates of the effect of debt on life satisfaction, where debt is split into categories based on the cost of servicing a given credit product[37].

[37] We sort debt from credit products into two categories ("high-cost debt" and "standard-cost debt") as suggested in *FCA OP 53 Belgibayeva et al. (2019)* and *Feedback Statement FS 17/2: High-cost credit and review of high-cost short-term credit price cap (FCA, 2017),* with the exception of debt from store cards, included in standard-cost debt because of the impossibility of separating it from credit card debt in round 6 of the WAS. Debt which falls in neither category is aggregated into a "other debt" category. Mortgage debt is kept separate. Refer to Table 1 for the list of credit products making up each category.

The most notable finding is the statistically significant and negative coefficient on high-cost credit products (Columns 5 to 7).[38] Life satisfaction decreases as individuals acquire debt which is costly to service. This effect is likely mostly driven by current account overdrafts.

The coefficients on the other debt categories are – with the exception of mortgage debt[39] – not statistically significantly different from zero.

When two lags are included in the model (Column 6), we find evidence of a statistically significant effect of standard-cost debt and other debt from the previous time period (lag one) on present wellbeing.

Controlling for present standard-cost debt, wellbeing today is slightly worse for individuals who were already indebted through a standard-cost credit product in the previous time period. This effect is significant at the 5% significance level and supportive of an adaptation narrative whereby the immediate positive impact on life satisfaction of acquiring a good or service (which most credit products aggregated into the standard-cost debt category are likely associated with) through the standard-cost credit product dissipate, whilst the cost – and the opportunity cost – of the debt is realised. The coefficient on the first lag of high-cost debt matches that of standard-cost debt closely, though it is estimated less precisely.

The positive coefficient on credit products and sources aggregated under the "other debt" category from the previous time period is likely driven by student debt (Column 6). Education progression – even if not yet yielding a degree – and early-career progression post-university – even if not associated with large salary increases – are two examples of how past student debt, present student debt being equal, can be associated with increased current life satisfaction and not picked up by any of the controls included in the model.

Table 3: The effect of debt on SWB, by cost of debt.

Dependent variable: life satisfaction (0-10)	Parametric		
	(5)	(6)	(7)
ln(Mortgage Debt)*it*	0.00761** (0.00369)	0.00577 (0.00590)	0.00517 (0.00580)

[38] Column 7 replicates Model 5 with the same sample as Model 6.

[39] The positive association of mortgage debt and SWB, despite controlling for house ownership, number of houses, marital status, and household size, is again suggestive of a failure to exhaustively control for omitted variables. One plausible explanation is that our age group dummies do not perfectly capture the evolution of life satisfaction over an individual's lifetime which is known to follow an inverse U-shape, and that age groups within which life satisfaction is increasing coincide with age groups for which mortgage debt is typically acquired. Though we pick up a positive relationship, a common finding in the literature is that mortgage debt is not associated with lower wellbeing.

ln(High-cost Debt)it	-0.0207*** (0.00384)	-0.0272*** (0.00651)	-0.0236*** (0.00606)
ln(Standard-cost Debt)it	0.00312 (0.00213)	-0.000625 (0.00324)	0.00121 (0.00307)
ln(Other Debt)it	-0.00437 (0.00361)	0.00366 (0.00584)	-0.00105 (0.00563)
ln(Mortgage Debt)$it-1$		0.00178 (0.00359)	
ln(High-cost Debt)$it-1$		-0.00875 (0.00606)	
ln(Standard-cost Debt)$it-1$		-0.00873** (0.00359)	
ln(Other Debt)$it-1$		0.0143** (0.00623)	
ln(Mortgage Debt)$it-2$		0.00215 (0.00369)	
ln(High-cost Debt)$it-2$		-0.00373 (0.00547)	
ln(Standard-cost Debt)$it-2$		0.000100 (0.00363)	
ln(Other Debt)$it-2$		0.00617 (0.00603)	
Observations	*96,076*	*45,443*	*45,443*
Individuals	*49,343*	*24,131*	*24,131*

*Notes: (source: Wealth and Assets Survey) standard errors clustered at individual level in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All debt variables are aggregated at household level. High-cost debt, Standard-cost debt and Other debt are aggregated as in Table 1. All credit products which make up the three categories, as well as Mortgage debt, include arrears. All regressions include the full set of controls listed in the notes below Table 2. All regressions include individual, year, and region-year fixed effects.*

Table 4 breaks up the analysis by all types of debt included in the Wealth and Assets Survey (Column 8). Coefficients on the individual credit products vary widely.

Keeping in mind that such effects may be inclusive of SWB-enhancing uses of the borrowed resources, we observe that, as well as the previously noted mortgage debt, debt from hire

purchase agreements, student debt and debt from personal loans are positively and statistically significantly associated with higher levels of life satisfaction.[40]

Coefficients which are negative and statistically significantly different from zero are those on credit, store and charge card debt, loans from pawnbrokers and cash converters, loans from family and / or friends, household bill arrears and current account overdrafts. Increases in all such credit products and sources of debt are therefore found to decrease life satisfaction.

Table 4: The effect of individual credit products on SWB.

Dependent variable: life satisfaction (0-10)	Parametric
	(8)
ln(Mortgage debt) it	0.00769** (0.00368)
ln(Card debt) it	-0.00467* (0.00256)
ln(Mail order debt) it	-0.00611 (0.00751)
ln(Hire purchase agreements debt) it	0.00779*** (0.00242)
ln(Student Loan Company debt) it	0.00793* (0.00412)
ln(Other student loan debt) it	0.0203*** (0.00675)
ln(Personal loan debt) it	0.00531* (0.00307)
ln(Cash loan debt) it	0.0156 (0.0175)
ln(PPC debt) it	-0.174** (0.0853)
ln(Credit Union debt) it	0.00352 (0.0224)
ln(Social Fund debt) it	0.0195 (0.0237)
ln(Employer loans debt) it	0.0125 (0.0235)

[40] The effect of debt from hire purchase agreements might well be contaminated by the enjoyment derived from using a good or asset (e.g. a vehicle) which would not be recorded by ownership controls until the end of the contract.

ln(Family or Friends debt) it	-0.0183** (0.00902)
ln(Payday loan debt) it	0.0201 (0.0482)
ln(Other loan debt) it	0.00816 (0.0106)
ln(Household bill arrears) it	-0.0538*** (0.0108)
ln(Current account overdraft debt) it	-0.0250*** (0.00407)
Observations	*96,076*
Individuals	*49,343*

*Notes: (source: Wealth and Assets Survey) standard errors clustered at individual level in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All debt variables are aggregated at household level. All credit products which have an arrear component include arrears. Card debt is made up of debt from credit, store, and charge cards. Cash loan debt refers to debt from cash loans collected at home. PPC debt refers to debt from pawnbrokers and cash converters. Credit Union debt refers to debt from loans from the credit unions. Social Fund debt refers to debt from loans from the Social Fund. Employer loans debt refers to debt from loans from employers. Family or Friends debt refers to debt from loans from family, friends and / or relatives. Other loan debt refers to debt from any loans that falls into other categories of loans. All regressions include the full set of controls listed in the notes below Table 2. All coefficients are derived from large cell sizes. All regressions include individual, year, and region-year fixed effects.*

4.2 Arrears

Table 5 separates the arrears component from the non-arrears component for each individual credit product[41] in Table 1 and aggregates the arrears components into a *total arrears* variable. Unlike Models 1 to 8, where the distinction is ignored, in Table 5 this variable is included in the regression alongside mortgage debt, high-cost debt, standard-cost debt and other debt, where now all of these exclude their arrear component.[42]

The effect of total arrear-debt is negative, statistically significant beyond the 1% significance level, and large relative to the effect of other aggregations of debt explored so far: a 1% increase in total arrears is approximately twice as harmful to life satisfaction as is the same increase in high-cost debt (Column 9). We believe this coefficient is robust to omitted

[41] Except where arrears for a given type of debt do not formally exist.

[42] Table 5 omits the rows for mortgage debt, high-cost debt, standard-cost debt and other debt, as their effect when their arrears component is taken out is not fundamentally dissimilar to their effect when they are not, seen in Table 3. They are however included in Appendix Table A1.

variable bias stemming from the enjoyment of newly available resources, as arrear-debt does not lead to an increase in resources available for expenditure.[43] [44]

Conditional on current total arrears, past total arrears do not significantly impact SWB (Column 10). In other words, it seems that it is only the current status of arrear indebtedness which affects wellbeing. An individual with a given amount of current total arrears and who had no arrears in the previous period would have roughly the same current level of life satisfaction as she would have if she had been already behind with her debt payments in the previous time period. The biennial nature of the Wealth and Assets Survey presents a caveat to this as we can only rule out wellbeing impacts with a two-year lag, whereas they may still be present with a lag of just one year.[45]

Table 5: The effect of arrear-debt on SWB.

Dependent variable: life satisfaction (0-10)	Parametric		
	(9)	(10)	(11)
ln(Total Arrears)it	-0.0578*** (0.00926)	-0.0544*** (0.0170)	-0.0524*** (0.0155)
ln(Total Arrears)$it-1$		-0.00898 (0.0168)	
ln(Total Arrears)$it-2$		0.00405 (0.0137)	
Observations	*96,076*	*45,443*	*45,443*
Individuals	*49,343*	*24,131*	*24,131*

*Notes: (source: Wealth and Assets Survey) standard errors clustered at individual level in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All debt variables are aggregated at household level. See Appendix Table A1 for the coefficients on High-cost debt, Standard-cost debt and Other debt. All regressions include the full set of controls listed in the notes below Table 2. All regressions include individual, year, and region-year fixed effects.*

Table 6 regresses life satisfaction on a dummy variable for being in arrears and total non-arrear-debt. According to the estimate in Column 12, significant beyond conventional levels, falling into arrears is associated with a 0.36-point decrease in life satisfaction. The magnitude

[43] Previous research, including Brown and Gray (2016), has shown how the incidence of indebtedness among individuals' reference group (for instance living in the same locality or in the same age group) can attenuate or exacerbate the effect of debt on SWB. To explore this, we add a control for the proportion of individuals in arrears within a respondent's age group. As we find that it does not change our coefficients of interest nor its t-statistic, we do not pursue it further.

[44] The coefficient on current "other debt" in Models 9 to 11 is now positive and significantly different from zero as a result of extracting household bill arrears from it, now included in the "total arrears" variable.

[45] Column 11 replicates Model 9 with the same sample as Model 10.

of the estimated impact of the event (falling into arrears) places it among other severely detrimental events found in the literature such as becoming unemployed.

Controlling for current arrears status, being in arrears in past time periods does not significantly lower current wellbeing.[46]

Table 6: The effect of being in arrears on SWB.

Dependent variable: life satisfaction (0-10)	Nonparametric		
	(12)	(13)	(14)
Whether in arrears it	-0.355*** (0.0550)	-0.402*** (0.103)	-0.378*** (0.0926)
ln(Non-arrear-debt)it	0.00420* (0.00236)	0.00360 (0.00350)	0.00369 (0.00338)
Whether in arrears $it-1$		-0.0694 (0.0974)	
ln(Non-arrear-debt)$it-1$		-0.00103 (0.00338)	
Whether in arrears $it-2$		-0.000905 (0.0842)	
ln(Non-arrear-debt)$it-2$		0.00122 (0.00343)	
Observations	*96,076*	*45,443*	*45,443*
Individuals	*49,343*	*24,131*	*24,131*

*Notes: (source: Wealth and Assets Survey) standard errors clustered at individual level in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All debt variables are aggregated at household level. A respondent is coded as being in arrears if total arrears is positive and / or if she has arrears on her credit / store / charge card (for which a respondent is asked whether she is in arrears but is not asked the amount).*

[46] Column 14 replicates Model 12 with the same sample as Model 13.

All regressions include the full set of controls listed in the notes below Table 2. All regressions include individual, year, and region-year fixed effects.

4.3 Heterogeneous Impacts

This section explores whether the effect of various definitions of indebtedness on wellbeing differs across vulnerable sub-groups of the population.[47]

We use four measures of vulnerability: belonging to the lower end of the income distribution, being unemployed or economically inactive, claiming benefits, and living in a deprived area.[48]

Appendix Table A2 interacts debt variables with belonging to the first three income quartiles. We find evidence that, while among the richest 25% of the income distribution an increase in total non-arrear debt is statistically associated with higher wellbeing, for individuals in the first three income quartiles there seems to be no effect. This difference would suggest either that the stress of indebtedness is felt more severely among poorer households, or that high-income households are more able to convert borrowed resources into greater wellbeing, or both. This relationship is clearer for some categories of debt than for others and seems to be especially driven by mortgage debt. The negative impact of being in arrears for households in the first poorest income quartile is double that experienced by households in the richest quartile, though neither the uninteracted nor the interacted coefficients are significant at conventional significance levels.

Appendix Table A3 interacts debt variables with being unemployed and being economically inactive. Across a number of debt types – and for non-arrear debt on aggregate – individuals outside the labour market are more severely hit by indebtedness than those who are active and employed. The negative effect of high-cost debt on life satisfaction is twice as large for inactive individuals than it is for the employed. Similarly, unemployed individuals who are in arrears are hit twice as hard as employed individuals.

Appendix Table A4 interacts debt variables with being a benefits claimant.[49] For all categories of debt, more vulnerable circumstances (in this case, claiming benefits) worsen the

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[47] The definitions of debt and indebtedness carried forward in this section are mortgage debt (excluding arrears), high-cost debt (excluding arrears), standard-cost debt (excluding arrears), other debt (excluding arrears), total arrears, being in arrears and non-arrear-debt.

[48] We also explored interactions between total arrears, being in arrears, and non-arrear-debt and the number of children within a household but found the coefficients on interactions to be insignificant.

[49] A change to the structure of benefits occurred in 2013 with the introduction of universal credit, so we include a selection of benefits across waves which might best capture individual vulnerability and maintain coherence before and after the change. Individuals are coded as receiving benefits in wave 3 if they claim any of the following: jobseekers' allowance; income support; incapacity benefit; employment and support allowance; disability living allowance – care component; disability living allowance – mobility component; attendance allowance; carer's allowance; pension credit; other, including: widows' and bereavement benefits; guardian's allowance; industrial disablement benefit; maternity pay/allowance; severe disablement allowance; statutory sick pay. Individuals are instead coded as receiving benefits in wave 4 and 5, and round 6, if they claim any of the following: universal credit; income support; jobseeker's allowance; employment and support allowance; carer's allowance; personal

experience of holding debt, though the difference is significant only in the case of mortgage debt and total non-arrear debt.

Finally, Appendix Table A5 interacts the same measures of indebtedness with the 2015 Index of Multiple Deprivation (IMD) score decile of the Lower Layer Super Output Area (LSOA) in which respondents reside. The multiple IMD domains could capture a broader state of vulnerability to financial hardship than a single measure such as income, employment status or claiming benefits. However, these interaction terms do not predict significant changes in SWB, perhaps reflecting the extent to which socio-economic circumstances can vary within LSOAs.

4.4 Dynamic effects between being in arrears and unemployment

Previous models have shown that arrears status – and total arrear-debt – in previous time-periods do not significantly impact current wellbeing. We also explore whether a specific sequence in the timing of being in arrears and being unemployed significantly predicts present wellbeing.

Models 23 and 24 in Appendix Table A6 show respectively that falling into arrears following a period of unemployment and becoming unemployed following a period of being in arrears, have large detrimental effects on current wellbeing. However, neither effect is significant at conventional significance levels.

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independence payment; disability living allowance; attendance allowance; severe disablement allowance; incapacity benefit; industrial injury disablement benefit; pension credit; widow's pension, bereavement allowance, widowed parent's allowance; armed forces compensation scheme; war widow's / widower's pension.

5 Applying the wellbeing impacts of debt to cost-benefit analysis

This section provides details as to how the coefficients derived in section 4 are monetised and applies the resulting wellbeing values to a recent cost-benefit analysis (CBA) conducted by the FCA.

5.1 Monetising the impacts of debt on wellbeing through the Three-Stage Wellbeing Valuation method

We monetise the wellbeing coefficients derived from our models via the following equation (Fujiwara, 2013):

$$CS = e^{\left[\frac{-g'_Q}{f'_M} + \ln(M^0)\right]} - M^0 \qquad \text{(Eq.2)}$$

Equation 2, the compensating surplus, can be interpreted as the amount of income needed to compensate an individual for experiencing a lower level of utility – proxied by life satisfaction – caused by the increase in indebtedness.

The parameters entering Equation 2 are the following:

1. M^0 is the reference income. We use the FYE2019 median UK equivalised household equivalised income of £29,600.[50]
2. f'_M is the impact of (log) annual income on life satisfaction.[51] We take the value of 1.103 (SE= 0.252) estimated in Fujiwara (2013).[52]
3. g'_Q is the marginal impact of a change in a given debt variable (e.g. in total arrears) on life satisfaction (LS). The example application in Section 5.3 assumes an increase in total arrears from £370 to £382, a 3.24% increase. Given our linear-log model, the corresponding change in life satisfaction (using the coefficient on total arrears from Model 9) is -0.0578 * ln([100+3.24] / 100) = -0.001845. Since the income coefficient f'_M is derived from a dataset where LS is measured on a 1-7 scale, we convert the change in LS due to

[50] Retrieved from ONS Estimates of median and mean disposable income for people in the UK for the financial year ending 2019. Wellbeing values are hence expressed in current prices. Purchasing power adjustments are not necessary if the reference income is expressed in real terms.

[51] A concern which may arise in applications when monetising the impacts of certain credit products is that these may be held specifically by population subgroups whose income is at one end of the distribution (e.g. arrear-debt may be held mostly by low-income individuals), and that the applied income coefficient may not be representative of the subgroup for which benefits are being monetised. This issue is overcome in Fujiwara (2013) by analysing a representative sample (BHPS) and specifying income logarithmically to take account of the diminishing marginal utility of income.

[52] Deaton (2008) estimates this relationship to be 0.838 (SE=0.051).

changes in debt variables estimated in this report (measured on a 0-10 scale) to the 1-7 scale. The change in LS following a 3.24% increase in total arrears on a 1-7 scale is -0.001845*6/10= -0.001107.

Section 5.3 applies these parameters to Equation 2 in an example cost-benefit analysis (CBA). Though plugging in the parameters set out above into Equation 2 provides close approximations of the point estimates of the wellbeing values, a more theoretically thorough approach provides point estimates which may offer slightly different values. The main reason for this difference is that $\frac{g'_Q}{f'_M}$ is a ratio of two random variables, and a well-known result is that the expected value of a ratio of two random variables does not equal the ratio of the expected values of the two random variables. It would therefore be more correct to simulate the two distributions and extract estimates from their ratio.[53]

5.2 Timing of wellbeing impacts

It is important to establish the duration for which wellbeing values following changes in indebtedness apply.

From our models we do not find strong evidence that debt from previous time periods continues to affect current wellbeing, holding current indebtedness constant. We suggest two possible scenarios which may explain this finding.

Firstly, it is possible there is no actual relationship between past indebtedness and current wellbeing (conditional on current indebtedness). Brown and Gray (2016), for example, also find no statistically significant relationship between past indebtedness and current wellbeing.

Secondly, it is possible that there exists a relationship, but we are not able to pick this up from the data either due to reduced sample size in lagged models or due to the biennial nature of the WAS. As the WAS is, in fact, biennial, our lagged models pick up the effect of changes in indebtedness on wellbeing two years (and four years) after they are experienced.

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[53] The following steps should be applied to obtain a confidence interval for the monetised values, and we recommend they be followed also to obtain precise point estimates (though these can be obtained by plugging in the parameters into Equation 2, point estimates obtained through the two approaches will differ): (1) generate a normal distribution with 10,000 observations with mean 1.103 and standard deviation 0.252, while imposing a lower threshold of 0.1 for stability (this is a conservative adjustment so that values for the income coefficient close to zero do not lead to implausibly large monetary values); (2) generate the inverse of this vector; (3) generate another normal distribution with 10,000 observations with the mean and standard deviation as obtained from a causal estimation of the effect of a nonmarket good on life satisfaction (0-10), e.g. -0.0578 and 0.00926 obtained from model 9; (4) multiply this vector by the scalar ln((100+*p*)/100), where *p* is the percentage change in the nonmarket good following an intervention, e.g. 3.24 as in the example application; (5) compute the transpose of the vector obtained from step 4; (6) multiply the vector obtained in step 2 by the vector obtained in step 5; (7) from this matrix, extract the mean and the 2.5% and 97.5% quantiles to construct the 95% confidence interval; (8) convert these values to a 1-7 scale by multiplying them by 0.6; (9) plug the values into Equation 2 in place of the $\frac{g'_Q}{f'_M}$ ratio.

We cannot exclude that there might be a statistically significant negative relationship which holds after one year, but which is insignificant after a time period equal to or greater than two years. In the absence of higher frequency data, the analyst estimating benefits may wish to make an assumption as to how the wellbeing impact dissipates from year 0 to year 2. For example, they could assume that this occurs linearly such that the year 1 impact is half of that at year 0, or base this on the 'adaptation coefficient' for similar outcomes for which higher frequency data does exist.

5.3 Application of monetised wellbeing values to an example CBA

The example drawn upon below is *Intervention 3: Earlier Intervention* from CP18/12, aimed at identifying potentially at-risk catalogue and store card credit customers and requiring firms to implement fee-freezes on late repayments prior to customers entering further financial difficulties.

We monetise the coefficient on total arrears (Model 9) using the Three-Stage Wellbeing Valuation method, and we apply the resulting wellbeing value to account for the avoidance of personal distress caused to customers who would fall further into arrears in the absence of the intervention.[54]

We estimate additional intangible benefits in the range of £439k-£494k attributable to the same year in which late fees are frozen. The estimation relies on the following assumptions:

1. Active agreements across catalogue and store card credit are 9.7m.[55]
2. 0.18% of the 9.7m individuals with active agreements across catalogue and store card credit may be in catalogue or store card credit arrears.[56] This amounts to 17,460 people.
3. The average amount of pre-existing catalogue and store card credit arrears of these 17,460 individuals is £370.[57]
4. With the implementation of the intervention (a freeze on late fees), 80-90% of consumers (13,968 to 15,714 individuals) avoid a one-off late fee of £12.[58]
5. The effect of total arrears from catalogue and store card credit on wellbeing does not differ from the effect of total arrears from all credit products on wellbeing.
6. The effect of the increase in arrears on wellbeing only holds in the year following the intervention and dissipates in its entirety subsequently.[59]

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[54] In this example we do not account for heterogeneous effects. Table 7 provides examples of monetising wellbeing costs for specific socio-economic subgroups of the population.

[55] See footnote 97, p.110 of CP18/12.

[56] Computed from wave 5 of WAS.

[57] Sample average in Wealth and Assets Survey for individuals who are in arrears on catalogue credit. Respondents are asked whether they are in arrears with payments on store cards but not the amounts of arrears owed.

[58] See paragraph 294, p.110 of CP18/12.

[59] We do not find a statistically significant effect of total arrears from past time periods on current wellbeing. Further discussion, as well as plausible alternate assumptions are provided in section 5.2.

Under this set of assumptions, the wellbeing costs avoided due to the freeze on late fees are £31.50 per person (95% CI: £17.47-£56.60) attributable to the year of the late fee freeze.[60] [61] [62] Multiplied by the number of consumers affected by the intervention, we estimate that the wellbeing costs avoided due to the intervention are in the range of £439k to £494k on aggregate (95% CI: £244k-£889k).

5.4 Further examples of monetising the wellbeing impacts of changes in debt variables

Table 7 presents estimates of total welfare changes following a range of scenarios.

Table 7: The effect of individual credit products on SWB.

Number of customers affected	Socio-economic group of customers	Credit product / type of debt held	Change in amount / status of indebtedness	Per-consumer compensating surplus	Total wellbeing costs
1,000	All	Arrear debt	Falling into arrears	**£6,746.38** *(CI: £3,627.30-£13,283.23)*	£6,746,381
1,000	Unemployed	Arrear debt	Falling into arrears	**£11,013.49** *(CI: £3,978.32-£25,194.59)*	£11,013,493
1,000	All	Arrear debt	1% increase	**£9.82** *(CI: £5.45-£17.59)*	£9,823
1,000	All	High-cost debt	1% increase	**£3.50** *(CI: £1.83-£6.42)*	£3,508
1,000	Inactive	High-cost debt	1% increase	**£4.95** *(CI: £2.02-£9.61)*	£4,956

[60] The wellbeing impacts (the monetised coefficients of the effect of a given debt variable on wellbeing) are additional to the monetary impact (a reduction or increase in individuals' debt) of interventions. The former may be smaller or larger than the latter, and simply reflect whether the monetary impact also translates or not into a wellbeing impact. This is perhaps best understood through the following example. Consider a policy that results in an increase in an individual's debt of £100. This increase may not affect the person's wellbeing in any way, though the monetary cost of the policy to the individual would still be £100. Hence any change to the wellbeing of the individual which may result from the £100 increase in debt must be considered on top of the monetary impact. In the CBA example under consideration in this section, the wellbeing cost is more than twice the size of the monetary impact of the intervention.

[61] See section 5.1 for the formula from which the value is derived and the parameters entering the calculation (Equation 2). The exact point estimate and confidence bounds are obtained by following the steps in the footnote in page 26.

[62] The large confidence interval reflects the fact that two estimates enter the calculation: the income coefficient computed in Fujiwara (2013) and the coefficient on total arrears estimated in Model 9.

Notes: Per-consumer compensating surpluses are computed using Equation 2, with the ratio $\frac{g'_Q}{f'_M}$ *and the confidence intervals being computed as steps in the footnote in page 26. 95% confidence intervals in parenthesis. The wide confidence intervals reflect uncertainty deriving from two parameters: the coefficients of debt variables estimated in this report, and the income coefficient estimated in Fujiwara (2013). The first two rows use the coefficients from Models 12 and 18. Row three uses the estimate from Model 9. Rows four and five use the coefficients from Models 5 and 17. As in the example in section 5.3, we assume that the wellbeing impacts dissipate the year following the intervention.*

6 Conclusion

In this report we derived estimates of the impact of various types of debt on subjective wellbeing and monetised the coefficient on arrear-debt using the Three-Stage Wellbeing Valuation approach.

Our results suggest that there is clear evidence of a negative relationship between arrear-debt and subjective wellbeing. We estimate that falling into arrears is associated with a 0.36-point drop in life satisfaction, our chosen proxy of subjective wellbeing. The magnitude of such impact positions it among some of the most destabilising events, in terms of wellbeing impacts, that individuals may experience.

We find that high-cost debt products are also significantly and negatively associated with lower wellbeing. This relationship is mostly driven by the negative impact of current account overdrafts on wellbeing.

There is compelling evidence that indebtedness affects vulnerable individuals most severely. Unemployment exacerbates the impact of being in arrears on wellbeing, and the impact of high-cost debt is larger for inactive individuals. Across most types of debt, the experience of holding debt is worse for poorer households than for richer households.

The impact on wellbeing of aggregate debt, as well as that of certain aggregations of debt such as standard cost debt and its constituent products, is less clear.

There is limited evidence that debt from previous time periods continues to affect present levels of wellbeing, and this impact is generally smaller than that of current period debt. In most cases these estimates are not significant at conventional statistical significance levels. Future research would benefit from larger sample sizes associated with further releases of WAS to estimate these relationships more precisely.

We argue that fewer causality concerns apply to estimates of arrear-debt than to other measures and types of debt explored in this report. In particular, while most credit products are associated with the availability of financial resources that can be spent in ways which may increase wellbeing and which are hard to control for comprehensively, the estimate of the effect of arrear-debt is likely not biased by such caveats, as arrear-debt is not associated with the availability of new financial resources.

Given our findings, the appraisal of policy interventions that alter the arrear status of individuals may wish to consider accounting for the resulting wellbeing impacts.

We monetise the coefficient on total arrears using the Three-Stage Wellbeing Valuation method and offer guidance on how to apply the monetised values in cost-benefit analysis through an example application. We expect that accounting for the intangible costs and

benefits which we shed light on in this report could provide a powerful means to aid the assessment of policy interventions.

Further research building on this report could explore a number of areas including the impacts of other outcomes relevant to FCA interventions on wellbeing, and the impacts of existing outcomes on alternative measures of subjective wellbeing. Triangulation of values could be furthered, for example, by exploring whether alternative empirical research designs are feasible given the context of this research and the availability of required data.

7 Appendix

Table A1: The effect of arrear-debt on SWB.

Dependent variable: life satisfaction (0-10)	Parametric		
	(9)	(10)	(11)
ln(Mortgage Debt)it	0.00749**	0.00563	0.00495
	(0.00368)	(0.00588)	(0.00578)
ln(High-cost Debt)it	-0.0197***	-0.0263***	-0.0231***
	(0.00383)	(0.00652)	(0.00605)
ln(Standard-cost Debt)it	0.00333	-0.000313	0.00148
	(0.00213)	(0.00324)	(0.00307)
ln(Other Debt)it	0.00701*	0.0155***	0.0107*
	(0.00369)	(0.00573)	(0.00566)
ln(Total Arrears)it	-0.0578***	-0.0544***	-0.0524***
	(0.00926)	(0.0170)	(0.0155)
ln(Mortgage Debt)$it-1$		0.00199	
		(0.00359)	
ln(High-cost Debt)$it-1$		-0.00818	
		(0.00608)	
ln(Standard-cost Debt)$it-1$		-0.00824**	
		(0.00359)	
ln(Other Debt)$it-1$		0.0170***	
		(0.00605)	
ln(Total Arrears)$it-1$		-0.00898	
		(0.0168)	
ln(Mortgage Debt)$it-2$		0.00234	
		(0.00369)	
ln(High-cost Debt)$it-2$		-0.00340	
		(0.00549)	
ln(Standard-cost Debt)$it-2$		-0.0000830	
		(0.00363)	
ln(Other Debt)$it-2$		0.00443	
		(0.00603)	
ln(Total Arrears)$it-2$		0.00405	
		(0.0137)	
Observations	*96,076*	*45,443*	*45,443*
Individuals	*49,343*	*24,131*	*24,131*

*Notes: (source: Wealth and Assets Survey) standard errors clustered at individual level in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All debt variables are aggregated at household level. High-cost debt, Standard-cost debt and Other debt are aggregated as in Table 1. All credit products which make up the three categories, as well as Mortgage debt, exclude arrears. All regressions include the full set of controls listed in the notes below Table 2. All regressions include individual, year, and region-year fixed effects.*

Table A2: Heterogeneity by household income

Dependent variable: life satisfaction (0-10)		Parametric	Nonparametric
	Income Quartile	(15)	(16)
ln(Mortgage Debt)$_{it}$		0.0168*** (0.00409)	
ln(High-cost Debt)$_{it}$		-0.00910 (0.00577)	
ln(Standard-cost Debt)$_{it}$		-0.000782 (0.00305)	
ln(Other Debt)$_{it}$		0.00498 (0.00453)	
ln(Total Arrears)$_{it}$		-0.0155 (0.0324)	
Whether in arrears $_{it}$			-0.147 (0.175)
ln(Non-arrear-debt)$_{it}$			0.0122*** (0.00322)
ln(Mortgage Debt)$_{it}$	*<25%*	-0.0193*** (0.00564)	
	25-50%	-0.0144*** (0.00415)	
	50-75%	-0.0122*** (0.00338)	
ln(High-cost Debt)$_{it}$	*<25%*	-0.0160 (0.00994)	
	25-50%	-0.0147* (0.00879)	
	50-75%	-0.0125 (0.00788)	
ln(Standard-cost Debt)$_{it}$	*<25%*	0.0112* (0.00574)	

	25-50%	0.00402 (0.00463)	
	50-75%	0.00293 (0.00414)	
ln(Other Debt)it	*<25%*	0.00542 (0.0116)	
	25-50%	-0.000633 (0.00800)	
	50-75%	0.00528 (0.00635)	
ln(Total Arrears)it	*<25%*	-0.0527 (0.0347)	
	25-50%	-0.0266 (0.0360)	
	50-75%	-0.0455 (0.0373)	
Whether in arrears it	*<25%*		-0.267 (0.190)
	25-50%		-0.127 (0.201)
	50-75%		-0.185 (0.211)
ln(Non-arrear-debt)it	*<25%*		-0.00964** (0.00485)
	25-50%		-0.0106*** (0.00394)
	50-75%		-0.0108*** (0.00342)
Observations		*96,076*	*96,076*
Individuals		*49,343*	*49,343*

*Notes: (source: Wealth and Assets Survey) standard errors clustered at individual level in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All debt variables are aggregated at household level. High-cost debt, Standard-cost debt and Other debt are aggregated as in Table 1 and do not include arrears. All regressions include the full set of controls listed in the notes below Table 2, with the addition of three (uninteracted) dummies for being in the first three income quartiles. Being in the fourth income quartile (75%+) is the omitted category. All coefficients are derived from large cell sizes. All regressions include individual, year, and region-year fixed effects.*

Table A3: Heterogeneity by employment status

Dependent variable: life satisfaction (0-10)		Parametric	Nonparametric
	Employment status:	(17)	(18)
ln(Mortgage Debt)$_{it}$		0.0131*** (0.00428)	
ln(High-cost Debt)$_{it}$		-0.0145*** (0.00428)	
ln(Standard-cost Debt)$_{it}$		0.00303 (0.00263)	
ln(Other Debt)$_{it}$		0.0113*** (0.00386)	
ln(Total Arrears)$_{it}$		-0.0510*** (0.0122)	
Whether in arrears $_{it}$			-0.271*** (0.0726)
ln(Non-arrear-debt)$_{it}$			0.0124*** (0.00326)
ln(Mortgage Debt)$_{it}$	*Unemployed*	0.00155 (0.0117)	
	Inactive	-0.0120*** (0.00435)	
ln(High-cost Debt)$_{it}$	*Unemployed*	-0.0291 (0.0198)	
	Inactive	-0.0145* (0.00846)	
ln(Standard-cost Debt)$_{it}$	*Unemployed*	0.00865 (0.0149)	
	Inactive	0.000126 (0.00404)	
ln(Other Debt)$_{it}$	*Unemployed*	-0.00232 (0.0187)	
	Inactive	-0.0195** (0.00874)	
ln(Total Arrears)$_{it}$	*Unemployed*	-0.0193 (0.0270)	
	Inactive	-0.0110 (0.0186)	

Whether in arrears it	*Unemployed*		-0.279* (0.164)
	Inactive		-0.130 (0.110)
ln(Non-arrear-debt)it	*Unemployed*		-0.00912 (0.0117)
	Inactive		-0.0139*** (0.00379)
Observations		*96,076*	*96,076*
Individuals		*49,343*	*49,343*

*Notes: (source: Wealth and Assets Survey) standard errors clustered at individual level in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All debt variables are aggregated at household level. High-cost debt, Standard-cost debt and Other debt are aggregated as in Table 1 and do not include arrears. All regressions include the full set of controls listed in the notes below Table 2. Being employed is the omitted category. All coefficients are derived from large cell sizes. All regressions include individual, year, and region-year fixed effects.*

Table A4: Heterogeneity by benefit claimant status

Dependent variable: *life satisfaction (0-10)*	Parametric	Nonparametric
	(19)	(20)
ln(Mortgage Debt)it	0.00898** (0.00371)	
ln(Mortgage Debt)it x Claims Benefits	-0.0152** (0.00702)	
ln(High-cost Debt)it	-0.0207*** (0.00385)	
ln(High-cost Debt)it x Claims Benefits	0.00588 (0.0114)	
ln(Standard-cost Debt)it	0.00338 (0.00212)	
ln(Standard-cost Debt)it x Claims Benefits	-0.000673 (0.00718)	
ln(Other Debt)it	0.00754** (0.00366)	
ln(Other Debt)it x Claims Benefits	-0.00292 (0.0129)	
ln(Total Arrears)it	-0.0521*** (0.0109)	
ln(Total Arrears)it x Claims Benefits	-0.0127	

	(0.0173)	
Whether in arrears it		-0.306*** (0.0633)
Whether in arrears it x Claims Benefits		-0.107 (0.105)
ln(Non-arrear-debt)it		0.00579** (0.00238)
ln(Non-arrear-debt)it x Claims Benefits		-0.0103* (0.00582)
Observations	*96,076*	*96,076*
Individuals	*49,343*	*49,343*

*Notes: (source: Wealth and Assets Survey) standard errors clustered at individual level in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All debt variables are aggregated at household level. High-cost debt, Standard-cost debt and Other debt are aggregated as in Table 1 and do not include arrears. All regressions include the full set of controls listed in the notes below Table 2, with the addition of a dummy for receiving selected benefits. All coefficients are derived from large cell sizes. All regressions include individual, year, and region-year fixed effects.*

Table A5: Heterogeneity by local-level deprivation (IMD)

Dependent variable: *life satisfaction (0-10)*	Parametric	Nonparametric
	(21)	(22)
ln(Mortgage Debt)it	0.00618 (0.00805)	
ln(Mortgage Debt)it x IMD score decile	-0.000270 (0.000965)	
ln(High-cost Debt)it	-0.0139 (0.00990)	
ln(High-cost Debt)it x IMD score decile	-0.00114 (0.00146)	
ln(Standard-cost Debt)it	0.00556 (0.00607)	
ln(Standard-cost Debt)it x IMD score decile	-0.000416 (0.000826)	
ln(Other Debt)it	0.00984 (0.0101)	
ln(Other Debt)it x IMD score decile	-0.000623 (0.00134)	
ln(Total Arrears)it	-0.0497*** (0.0178)	

ln(Total Arrears)it x IMD score decile	-0.00229 (0.00363)	
Whether in arrears it		-0.305*** (0.107)
Whether in arrears it x IMD score decile		-0.0108 (0.0218)
ln(Non-arrear-debt)it		-0.000377 (0.00641)
ln(Non-arrear-debt)it x IMD score decile		0.000518 (0.000846)
Observations	*79,807*	*79,807*
Individuals	*40,974*	*40,974*

*Notes: (source: Wealth and Assets Survey) standard errors clustered at individual level in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All debt variables are aggregated at household level. High-cost debt, Standard-cost debt and Other debt are aggregated as in Table 1 and do not include arrears. All regressions include the full set of controls listed in the notes below Table 2, with the addition of a variable for the IMD score decile for the LSOA in which the respondent resides. The drop in sample size is due to IMD scores being available for England only. All coefficients are derived from large cell sizes. All regressions include individual, year, and region-year fixed effects.*

Table A6: Dynamic effects between unemployment and being in arrears

Dependent variable: life satisfaction (0-10)	Nonparametric	
	(23)	(24)
Whether in arrears it	-0.416*** (0.0868)	-0.367*** (0.0711)
ln(Non-arrear-debt)it	0.00491 (0.00346)	0.00345 (0.00271)
Whether in arrears $it-1$		0.0558 (0.0757)
ln(Non-arrear-debt)$it-1$		-0.00525 (0.00334)
Whether in arrears it x Unemployed $it-1$	-0.214 (0.197)	
Whether in arrears it x Inactive $it-1$	0.156 (0.129)	
ln(Non-arrear-debt)it x Unemployed $it-1$	-0.0219* (0.0126)	
ln(Non-arrear-debt)it x Inactive $it-1$	-0.000668 (0.00415)	
Whether in arrears $it-1$ x Unemployed it		-0.265

		(0.197)
Whether in arrears $it-1$ x Inactive it		-0.0981 (0.113)
ln(Non-arrear-debt)$it-1$ x Unemployed it		0.0268* (0.0140)
ln(Non-arrear-debt)$it-1$ x Inactive it		0.00136 (0.00427)
Observations	*70,145*	*70,854*
Individuals	*34,621*	*35,148*

*Notes: (source: Wealth and Assets Survey) standard errors clustered at individual level in parentheses (*** p<0.01, ** p<0.05, * p<0.1). All debt variables are aggregated at household level. High-cost debt, Standard-cost debt and Other debt are aggregated as in Table 1 and do not include arrears. All regressions include the full set of controls listed in the notes below Table 2. Regression 23 adds individual dummies for lagged employment status. All coefficients are derived from large cell sizes. All regressions include individual, year, and region-year fixed effects.*

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