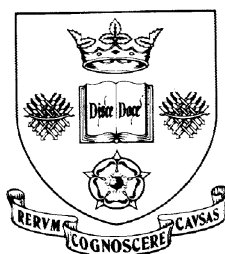# Sheffield Economic Research Paper Series

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Household Finances and the 'Big Five' Personality Traits

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Household Finances and the 'Big Five' Personality Traits

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Abstract: We explore the relationship between household finances and personality traits from an empirical perspective. Specifically, using individual level data drawn from the British Household Panel Survey, we analyse the influence of personality traits on financial decision-making at the individual level focusing on decisions regarding unsecured debt acquisition and financial assets. Personality traits are classified according to the 'Big Five' taxonomy: openness to experience, conscientiousness, extraversion, agreeableness and neuroticism. We find that certain personality traits such as extraversion and openness to experience exert relatively large influences on household finances in terms of the levels of debt and assets held. In contrast, personality traits such as conscientiousness and neuroticism appear to be unimportant in influencing levels of unsecured debt and financial asset holding. Our findings also suggest that personality traits have different effects across the various types of debt and assets held. For example, openness to experience does not appear to influence the probability of having national savings but is found to increase the probability of holding stocks and shares, a relatively risky financial asset.

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1. Introduction and Background

Over the last three decades, there has been increasing interest in household finances in the economics literature (see Guiso et al., 2002, for a comprehensive review of the existing studies in this area). In general, in the existing literature, economists have focused on specific aspects of the household financial portfolio such as debt (see, for example, Brown and Taylor, 2008), the demand for risky financial assets (see, for example, Hochguertel et al., 1997) and savings (see, for example, Browning and Lusardi, 1996). One area, which has attracted limited interest in the existing literature on household finances, concerns the relationship between household finances and personality traits. In contrast, the implications of personality traits for economic outcomes such as earnings and employment status have started to attract the attention of economists (see, for example, Caliendo et al., 2011, and Heineck and Anger, 2010). It is apparent that personality traits may influence financial decision-making at the individual and household level including decisions regarding debt acquisition and the holding of financial assets.

Some personality characteristics have already been identified as important determinants of aspects of individual and household finances. For example, Brown et al. (2005) analyse British panel data and find that financial expectations are important determinants of unsecured debt at both the individual and the household level, with financial optimism being positively associated with the level of unsecured debt. In a more recent study, Brown et al. (2008) report a similar positive relationship between optimistic financial expectations and the level of secured, i.e. mortgage, debt. In the context of saving, Lusardi (1998), for example, explores the importance of precautionary saving exploiting U.S. data on individuals' subjective probabilities of job loss from the Health and Retirement Survey. Evidence in favour of precautionary

saving is found for a sample of individuals who are close to retirement. In a similar vein, Guariglia (2001) uses the British Household Panel Survey (BHPS) to ascertain whether households save in order to self-insure against uncertainty. The findings support a statistically significant relationship between earnings variability and household saving, with households saving more if they are pessimistic about their future financial situation.

One important issue in the empirical literature on personality concerns the measurement of personality traits. As stated by Almlund at al. (2011), p. 47, "personality traits cannot be directly measured." The Big Five personality trait taxonomy developed by Costa and McCrae (1992) has been widely used to classify personality traits in the psychology literature and is being increasingly used in economics. This approach classifies individuals according to five factors: openness to experience, conscientiousness, extraversion, agreeableness and neuroticism (emotional instability). Almlund et al. (2011), p. 18, comment that "the Big Five factors represent personality traits at the broadest level of abstraction .... (they) are defined without reference to any context (i.e. situation)."[1] Furthermore, they comment on the evidence in the psychology literature which suggests that the majority of variables used to describe personality traits in the existing literature can be mapped onto at least one of the Big Five.

Caliendo et al. (2011) analyse personality characteristics and the decision to become and remain self-employed. They focus on the Big Five taxonomy and present a clear and concise overview of each classification. To be specific, extraversion is described as including variables indicating the extent to which individuals are

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[1] Although widely accepted in the psychology literature, alternative approaches to the Big Five approach have been put forward including approaches with fewer than five factors and approaches with more than five factors. See Almlund et al. (2011) for a discussion of the alternatives to and criticisms of the Big Five approach that have been put forward in the psychology literature. Criticisms levelled at the Big Five approach include concerns regarding its atheoretical nature.

assertive, dominant, ambitious and energetic; emotional stability (opposite to neuroticism) is described as relating to self-confidence, optimism and the ability to deal with stressful situations; openness to experience is described as relating to an individual's creativity, innovativeness and curiosity; conscientiousness encompasses two distinct aspects, being achievement oriented and being hard-working; and, finally, agreeableness is described as relating to being cooperative, forgiving and trusting (Caliendo et al., 2011). Their findings suggest that openness to experience and extraversion play an important role in entrepreneurial development.

In this paper, we explore the relationship between personal finances and personality traits as classified by the Big Five taxonomy in order to further our understanding of the determinants of personal finances. Existing studies have generally focused on one particular aspect of an individual's personality such as optimism or attitudes towards risk. In contrast, we adopt a general approach which essentially encompasses an extensive variety of personality traits.

Our empirical results suggest that certain personality traits do influence the amount of unsecured debt and financial assets held by individuals. Specifically, we find that personality traits such as extraversion and openness to experience exert relatively large influences on household finances in terms of the levels of assets and debt held. In contrast, personality traits such as conscientiousness and neuroticism appear to be unimportant in influencing the levels of unsecured debt and financial assets. With respect to types of debt and assets held, the results of the empirical analysis suggest that personality traits have different effects across the various types of debt and assets. For example, openness to experience does not appear to influence the probability of having national savings but is found to increase the probability of holding stocks and shares, a relatively risky type of financial asset. Thus, overall, our

empirical evidence suggests that personal traits are important determinants of household finances.

2. Data and Methodology

Our empirical analysis is based on the British Household Panel Survey (BHPS), a survey conducted by the Institute for Social and Economic Research comprising approximately 10,000 annual individual interviews. For wave one, interviews were carried out during the autumn of 1991. The same households are re-interviewed in successive waves – the latest available being 2008. Information is gathered relating to adults within the household. Information on the personality traits of individuals, is however, only available in one wave relating to 2005.[2] Hence, our empirical analysis focuses on this wave.

Individuals are asked to rate themselves on a seven point scale from 'does not apply', which takes the value of 1, to 'applies perfectly', which takes the value of 7, according to three statements relating to each of the five personality factors. Hence, there are 15 questions in total, which are detailed in the table below. The final two columns present the mean and standard deviation relating to the average score for each of the 15 questions, with the average score across the three statements for each of the five factors also presented in the table. The summary statistics relate to two samples: all individuals aged over 18 (13,250 observations) and individuals aged 30 to 65 (8,372 observations).

Big Five Personality Traits	BHPS Statements	Mean (*Standard Deviation*); Sample aged over 18; 13,250 observations	Mean (*Standard Deviation*); Sample Aged 30-65; 8,372 observations
1. Conscientiousness	1. I see myself as someone who does a thorough job.	5.3059 (*1.6382*)	5.4580 (*1.5362*)
	2. I see myself as someone who tends to be lazy.*	2.7622 (*1.6366*)	2.6370 (*1.5818*)
	3. I see myself as someone who does things efficiently.	5.3203 (*1.2791*)	5.3955 (*1.2128*)
Overall Mean (*Standard Deviation*)		4.4628 (*0.9018*)	4.4968 (*0.8410*)
2. Extraversion	1. I see myself as someone who is talkative.	4.5831 (*1.6859*)	4.5800 (*1.6234*)
	2. I see myself as someone who is outgoing, sociable.	4.8104 (*1.5992*)	4.7467 (*1.5500*)
	3. I see myself as someone who is reserved.*	4.0364 (*1.5957*)	4.0397 (*1.5752*)
Overall Mean (*Standard Deviation*)		4.4766 (*1.1765*)	4.4553 (*1.1634*)
3. Agreeableness	1. I see myself as someone who is sometimes rude to others.*	5.8587 (*1.3712*)	5.8736 (*1.3307*)
	2. I see myself as someone who has a forgiving nature.	5.0518 (*1.5294*)	5.0683 (*1.4875*)
	3. I see myself as someone who is considerate and kind to almost everyone.	5.4565 (*1.2925*)	5.4657 (*1.2501*)
Overall Mean (*Standard Deviation*)		5.4557 (*1.0058*)	5.4692 (*0.9818*)
4. Neuroticism	1. I see myself as someone who worries a lot.	3.8463 (*1.7851*)	3.9348 (*1.7382*)
	2. I see myself as someone who gets nervous easily.	3.4955 (*1.7378*)	3.5204 (*1.7124*)
	3. I see myself as someone who is relaxed, handles stress well.*	3.6694 (*1.5527*)	3.6898 (*1.5159*)
Overall Mean (*Standard Deviation*)		3.6704 (*1.3232*)	3.7150 (*1.3005*)
5. Openness to experience	1. I see myself as someone who is original, comes up with new ideas.	4.2152 (*1.5120*)	4.2526 (*1.4488*)
	2. I see myself as someone who values artistic, aesthetic experiences.	4.2582 (*1.6990*)	4.3094 (*1.6435*)
	3. I see myself as someone who has an active imagination.	4.8663 (*1.4926*)	4.8500 (*1.4400*)
Overall Mean (*Standard Deviation*)		4.4465 (*1.2259*)	4.4705 (*1.1802*)

Note: * denotes that the score relating to this statement has been reversed.

The analysis of two samples of individuals reflects an issue which has been widely discussed in the existing literature concerning the stability of personality traits over time. In the psychology literature, it has been argued that the personality traits included in the Big Five taxonomy are stable over the life cycle (see, for example, Caspi et al. 2005). Similar conclusions are reached by Borghans et al. (2008). If

personality traits do change over time, however, then the potential for reverse causality arises. Recently, Cobb-Clark and Schurer (2011a) assess the validity of the assumption that a specific non-cognitive skill, namely locus of control, is stable over time. Such an assumption, which has frequently been made in the context of limited data availability, is supported by findings in the psychology literature, which suggest stability in personality traits from age 30 onwards (see, for example, McCrae and Costa, 2006). It should be acknowledged, however, that the issue of such stability does remain an area of debate in the psychology literature (Cobb-Clark and Schurer, 2011a). Indeed, Almlund et al. (2011) conclude that personality does change over the life cycle. The findings of Cobb-Clark and Schurer (2011a) suggest that short-run and medium-run changes are somewhat modest and tend to be found in young (aged below 20) or very old individuals (aged over 80). As such, they suggest focusing analysis of non-cognitive skills on individuals of working age. Similarly, Cobb-Clark and Schurer (2011b) present evidence based on analysis of the 2005 and 2009 waves of the Household, Income and Labour Dynamics in Australia (HILDA), which suggests that non-cognitive skills as measured by the Big Five are stable amongst working age adults and "may be seen as stable inputs into many economic decisions." (Cobb-Clark and Schurer, 2011b, p.6). Thus, we conduct our analysis for the two age groups in order to explore the robustness of the empirical analysis.

We then follow the standard approach in the literature and create the standardized Cronbach alpha reliability index in order to assess the internal consistency of the three items, leading to the following reliability measures for the aged over 18 sample (aged 30 to 65 sample): conscientiousness, 0.53 (0.56); extraversion, 0.54 (0.57); agreeableness, 0.53 (0.55); neuroticism, 0.68 (0.69); and, finally, openness to experience, 0.68 (0.68).

Firstly, we explore the influence of the Big Five personality traits on two aspects of finances, namely, the amount of unsecured debt (d_{hi}) and the total value of financial assets held by individual i within household h (a_{hi}).[3] In order to explore the determinants of assets and debt at the individual level, we treat a_{hi} and d_{hi} as censored variables in our econometric analysis since they cannot have negative values. Following Bertaut and Starr-McCluer (2002), we employ a censored regression approach to ascertain the determinants of $\ln(a_{hi})$ and $\ln(d_{hi})$, which allows for the truncation of the dependent variables.[4] We denote by $\ln(a_{hi}^{*})$ and $\ln(d_{hi}^{*})$ the corresponding untruncated latent variables, which theoretically can have negative values. We model $\ln(a_{hi})$ and $\ln(d_{hi})$ via a random effects tobit specification for each dependent variable as follows:

$$\ln\left(d_{hi}^{*}\right) = \boldsymbol{\beta}_{1}^{'} \boldsymbol{X}_{hi} + \sum_{j=1}^{5} \gamma_{j} Z_{jhi} + \varepsilon_{hi_{1}} \tag{1}$$

$$\ln\left(d_{hi}\right) = \ln\left(d_{hi}^{*}\right) \quad if \quad \ln\left(d_{hi}^{*}\right) > 0 \tag{2}$$

$$\ln\left(d_{hi}\right) = 0 \quad otherwise \tag{3}$$

$$\ln\left(a_{hi}^{*}\right) = \boldsymbol{\beta}_{2}^{'} \boldsymbol{X}_{hi} + \sum_{j=1}^{5} \pi_{j} Z_{jhi} + \varepsilon_{hi_{2}} \tag{4}$$

$$\ln\left(a_{hi}\right) = \ln\left(a_{hi}^{*}\right) \quad if \quad \ln\left(a_{hi}^{*}\right) > 0 \tag{5}$$

$$\ln\left(a_{hi}\right) = 0 \quad otherwise \tag{6}$$

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[3] Financial investments include: national savings certificates; premium bonds; unit/investment trusts; personal equity plans; shares; national saving bonds; other investments; savings accounts; national saving bank; and Tax Exempt Special Savings Accounts (TESSAs) and Individual Savings Accounts (ISAs).

[4] In order to deal with the zero values of unsecured debt and financial assets, we add one to each series.

where the debts (assets) of individual i in household h are given by d_{hi} (a_{hi}) such that $i=1,\ldots,n$ with $i \in h$ and $h=1,\ldots,n_h$, X_{hi} denotes a vector of individual and household characteristics (where throughout we use the same covariates in both the debt and asset equations), Z_{jhi} denotes each element of the Big Five ($j=1,\ldots,5$) and ε_{hi_1} and ε_{hi_2} are the stochastic disturbance terms. In both equations, the structure of the error terms is given as follows: $\varepsilon_{hi} = \alpha_h + \eta_{hi}$, where α_h is a household specific unobservable effect, and η_{hi} is a random error term, $\eta_{hi} \; IID\left(0,\sigma_h^2\right)$. The correlation between the error terms of individuals in the same household is a constant given by: $\rho = corr\left(\varepsilon_{il},\varepsilon_{ik}\right) = \sigma_\alpha^2 / \left(\sigma_\alpha^2 + \sigma_\eta^2\right)$ $l \neq k$ where ρ represents the proportion of the total unexplained variance in the dependent variable contributed by the household panel level variance component.

We draw upon the existing literature to specify X_{hi} which includes controls for: gender; age; ethnicity; marital status; labour force status; highest educational qualification; self-assessed health status; the natural logarithm of household labour income; the natural logarithm of household non labour income; the natural logarithm of permanent household income;[5] the number of children in the household; the number of adults in the household; and housing tenure.

We then perform quantile regression analysis (see Koenker and Bassett Jr., 1978, Koenker and Hollock, 2001) in order to further analyse the determinants of $\ln\left(d_{hi}\right)$ and $\ln\left(a_{hi}\right)$, focusing on where $d_{hi} > 0$ and $a_{hi} > 0$. Quantile regression analysis has the advantage that a full characterisation of the conditional distribution of

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[5] Permanent household income is proxied by the average sum of total income of individuals within the household of the month prior to interview over the length of time the individual is observed in the panel.

the dependent variable is accounted for and that it enables an analysis of different parts of the conditional distribution hence providing a fuller description of the whole distribution. This is because when considering the effect of covariates on $\ln\left(d_{hi}\right)$ or $\ln\left(a_{hi}\right)$ quantile regression analysis allows the effect of independent variables on the dependent variable to differ at different quantiles of the conditional distribution. Thus, instead of assuming that covariates shift only the location or the scale of the conditional distribution, quantile regression considers the potential effects of covariates on the shape of the distribution. The quantile regression approach for $\ln\left(d_{hi}\right)$ is given by:

$$\ln\left(d_{hi}\right) = \boldsymbol{X}_{hi}\boldsymbol{\phi}_{\theta} + \sum_{j=1}^{5}\gamma_{\theta j}Z_{jhi} + \varepsilon_{\theta hi} \tag{7}$$

where $\varepsilon_{\theta hi}$ is the error term associated with the θth quantile of $\ln\left(d_{hi}\right)$ and $\text{Quant}_{\theta}\left(\varepsilon_{\theta hi}\big|\boldsymbol{X}_{hi}, Z_{jhi}\right) = 0$. The θth conditional quantile of $\ln\left(d_{hi}\right)$ for a given set of characteristics, $\boldsymbol{X}_{hi}$, Z_{jhi}, is denoted by:

$$\text{Quant}_{\theta}\left\{\ln\left(d_{hi}\right)\big|\boldsymbol{X}_{hi}, Z_{jhi}\right\} = \boldsymbol{X}_{hi}\boldsymbol{\phi}_{\theta} + \sum_{j=1}^{5}\gamma_{\theta j}Z_{jhi} \tag{8}$$

where $\boldsymbol{\phi}_{\theta}$ and $\gamma_{\theta j}$ are vectors of parameters. We explore the 25$^{\text{th}}$ percentile, the 50$^{\text{th}}$ percentile and the 75$^{\text{th}}$ percentile, i.e. $\theta = 0.25$, $\theta = 0.50$ and $\theta = 0.75$, respectively. We then repeat the analysis with $\ln\left(a_{hi}\right)$ as the dependent variable.

In order to explore the effect of personality traits on the type of unsecured debt and financial assets held, we estimate a series of random effects probit models where the dependent variable indicates whether or not the individual holds a particular type of debt or asset. For unsecured debt, we distinguish between six types of debt: hire

purchase agreements; personal loans from banks, building societies or other financial institutions; credit cards; loans from private individuals; overdrafts; and other debt including catalogue or mail purchase agreements and student loans. With respect to financial assets, we again distinguish between six types, namely: national savings certificates, national savings, building society and insurance bonds; premium bonds; unit/investment trusts; personal equity plans; shares; and other investments, government or company securities.[6]

Defining P_{hi}^{*} as a continuous unobserved latent dependent variable, such as the utility gained from holding a particular type of debt or asset, and P_{hi} as the observed empirical binary counterpart, our probit models are defined as follows:

$$P_{hi} = 1 \quad if \quad P_{hi}^{*} = \boldsymbol{\psi}'\boldsymbol{X}_{hi} + \sum_{j=1}^{5} \lambda_j Z_{jhi} + \varepsilon_{hi} > 0$$
$$P_{hi} = 0 \quad otherwise \tag{9}$$

where $\boldsymbol{X}_{hi}$ denotes the vector of individual and household characteristics as described above, Z_{jhi} denotes each element of the Big Five (j=1,...,5), i=1,…,n with $i \in h$, h=1,…,n_h and $\varepsilon_{hi} = \alpha_h + v_{hi}$. Once again, we adopt a random effects specification, where the household specific unobservable effect in the error term is denoted by α_h and v_{hi} is a random error term, i.e. $v_{hi} \sim IID\left(0, \sigma_h^2\right)$. As with modelling the levels of debt and assets, this specification allows for intra-household correlation between the error terms of individuals in the same household, i.e. $\rho = corr\left(\varepsilon_{il}, \varepsilon_{ik}\right) = \sigma_\alpha^2 \big/ \left(\sigma_\alpha^2 + \sigma_v^2\right) \quad l \neq k$.

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[6] Unfortunately, information regarding the amount held in each debt and asset category is unavailable in the data set.

As previously stated, in order to explore the robustness of our findings we estimate the models described above for individuals aged above 18 and when restricting the age of individuals to lie between 30 and 65, yielding samples of 13,250 and 8,372 observations, respectively. Summary statistics for unsecured debt, financial assets and the independent variables are shown in Table 1 for the sample of individuals aged over 18 and also for the sample of individuals aged between 30 and 65. Approximately 46% of individuals in the two samples are male and 48% are in good health. The average level of unsecured debt in 2005 is 2.612 natural logarithm units or £2,065 and the average level of financial assets in 2005 is 1.542 natural logarithm units or £3,260. Figures 1 and 2 show the distributions of the natural logarithm of unsecured debt (for debtors) and the natural logarithm of financial assets (for those who hold positive assets) respectively, where it can be seen that, compared to financial assets, the distribution of liabilities is skewed towards the right.

3. Results

Analysis of the Amount of Debt and Asset Holding

Table 2 presents the results from the random effects tobit analysis relating to the determinants of the amounts of debt and financial assets held for the two age groups, namely, aged 18 and over and aged between 30 and 65, where marginal effects are presented throughout. The exception is the intercept term, which is unscaled and reported to calculate the effects of the dummy variables (see below). Assuming the errors are normally distributed, an approximation to the probability of a non-censored observation, or scaling factor, is given by the proportion of uncensored observations. For unsecured debt and financial assets, the proportions of uncensored observations are 0.36 and 0.24, respectively for the sample aged over 18, and 0.34 and 0.22, respectively for the sample of individuals aged 30-65. The relevant scaling factor can

be used to calculate the marginal effects by multiplying the coefficients through by this factor. Clearly, there is evidence of positive intra-household correlation in the error terms and this is relatively large in magnitude. In Table 2 Panel A, all of the five personality variables are included simultaneously, whilst in Table 2 Panel B the Big Five variables are entered one by one.[7]

Focusing upon the results in Table 2 Panel A, it is apparent that unsecured debt is monotonically decreasing in age, which is consistent with the findings of Cox and Jappelli (1993). This is the case for both the full sample (where the omitted category is aged over 65) and the sample of individuals aged 30 to 65 (where the omitted category is aged 60 to 65). For example, for the sample of all individuals aged over 18, compared to those aged over 65, it can be seen from Table 2 Panel A that individuals aged 18 to 29 have the highest levels of debt and lowest levels of financial assets. More specifically, focusing upon debt, evaluating the expected value function of truncated logged unsecured debt, when all covariates, including the dummy variables, are equal to 0 (in the reference categories), then:

$$E\left\{\ln\left(d_{hi}\right)\middle|X_{hi}=0, Z_{jhi}=0\right\} = \Phi\left(\beta_0/\sigma\right)\beta_0 + \sigma\phi\left(\beta_0/\sigma\right)$$

which has the value 2.0474, i.e.

$$E\left\{\ln\left(d_{hi}\right)\middle|X_{hi}=0, Z_{jhi}=0\right\} =$$
$$\left[\Phi\left(-9.3763/6.7976\right)\times-9.3763\right] + \left[6.7976\times\phi\left(-9.3763/6.7976\right)\right]$$

where ϕ and Φ denote the density and cumulative distributions of the standard normal distribution, β_0 is the intercept and σ is the standard error of the regression. Hence, log unsecured debt is 2.0474 for the over 65 group as compared to

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[7] In Table 2 Panel B and Tables 3, 4 and 5, for brevity, the results are summarised in that only the results relating to our particular covariates of interest, namely the Big Five personality traits, are presented. All of the other covariates, as shown in Table 2 Panel A, are also included in all the specifications. In general, the results relating to the other covariates accord with those presented in Table 2 Panel A and are available from the authors on request.

2.0474+2.8349=4.88 for those aged 18 to 24, i.e. the youngest age category holds over twice as much debt as the oldest category in the sample. Evaluated at the mean, this implies unsecured debt of £4,130 compared to £2,065.

Turning briefly to the other controls before focusing on the influence of the personality characteristics, it is apparent that, for both samples of individuals, the level of debt is increasing in educational attainment. Interestingly, the health of the individual has opposing effects on debt and assets, where those in poor health (the omitted category) have higher levels of unsecured debt but lower levels of financial assets. In terms of income, focusing upon the full sample, household income from employment has a small but positive impact upon both debt and financial assets, whilst non labour income is positively associated with financial assets. These effects exist after controlling for permanent income. Specifically, a one per cent increase in household labour income is associated with a 0.026 (0.038) percentage point increase in unsecured debt (financial assets). These findings generally tie in with the findings in the existing literature, see, for example, Brown and Taylor (2008), Crook (2001) and Gropp et al. (1997).

Focusing upon the Big Five personality traits, it is apparent that, for both age groups, extraversion has the largest effect on debt in terms of magnitude as compared to the influence of the other four personality traits, with a highly statistically significant positive influence. For example, for the sample of individuals aged over 18, a one standard deviation increase in extraversion is associated with a 22 percentage point increase in unsecured debt. In contrast, extraversion has a relatively large inverse effect on financial asset holding for both age groups suggesting that this personality trait has opposing influences on liabilities and assets. Hence, our findings suggest that being assertive, ambitious and energetic is positively associated with the

amount of unsecured debt held, yet negatively associated with financial asset accumulation. Openness to experience is the only other personality trait to exhibit consistent findings across the samples with positive effects found in the context of both debt and assets, with the statistical significance of this effect being particularly strong in the case of financial asset holding, suggesting that creativity, innovativeness and curiosity play an important role here. For example, for the sample of individuals aged over 18, a one standard deviation increase in openness to experience is associated with a 21 per cent increase in financial assets. In general, the influence of these personality traits is apparent for both age groups. For those aged 30 to 65, as discussed earlier, personality traits are argued to be more stable, and hence the likelihood of reverse causality is reduced in this case. Indeed, the effects are similar in both magnitude and statistical significance across the two samples.

We have also explored the robustness of the results if each of the five personality variables is included separately rather than jointly in the tobit analysis. The broad pattern of results described above is also found when each of the personality variables are entered separately, see Table 2 Panel B. Interestingly, conscientiousness and neuroticism are the two personality traits which consistently fail to exert an influence on either unsecured debt or financial asset holding indicating that these personality traits are not important in influencing these aspects of an individual's economic decision-making, *ceteris paribus*. Given that neuroticism is related to pessimism, such findings are interesting in the context of the positive association found in the existing literature relating to financial optimism and debt. The results pertaining to agreeableness are inconsistent in the context of statistical significance with a positive and statistically significant effect found for debt for the sample of individuals aged over 18, an effect which remains positive yet is of less

statistical significance for the sample of individuals aged 30 to 65. For financial assets, agreeableness appears to exert a negative effect albeit with limited statistical significance. Hence, the results relating to this particular personality trait appear to be somewhat inconclusive.

Turning to the quantile analysis, Table 3 Panel A summarises the results relating to the determinants of unsecured debt across the 25th, 50th and 75th quantiles, whereas Table 3 Panel B presents the corresponding analysis for financial assets, where each sample relates to where $d_{hi} > 0$ and $a_{hi} > 0$, respectively. For unsecured debt, it is apparent that conscientiousness has a consistent positive effect across the two samples only at the 50th quantile of the debt distribution, whilst contrary to the tobit analysis, extraversion appears to have no influence across the three quantiles of the unsecured debt distribution for individuals with positive unsecured debt. Such findings suggest that extraversion influences the holding of debt *per se* rather than the amount held. In contrast, agreeableness, i.e. being cooperative and trusting, exerts a negative influence on the level of unsecured debt in both samples and across the three quantiles, with the magnitude and statistical significance of the influence being heightened at the 25th and 50th quantiles. The influence of neuroticism is once again largely statistically insignificant with the exception of a positive influence on unsecured debt at the 50th quantile for the sample of individuals aged over 18. The influence of openness to experience is found to be positive yet only consistently attaining statistical significance at the 75th quantile in both samples, suggesting that personality traits relating to curiosity, creativity and innovativeness only influence debt at the highest parts of the unsecured debt distribution.[8] For example, focusing upon those individuals aged 30 to 65, a one standard deviation increase in openness to

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[8] The results in Table 3 Panels A and B are also robust to including the personality traits separately rather jointly.

experience increases the level of debt at the top end of the distribution by 13 percentage points.

Interestingly, for the quantile analysis of financial assets, the results presented in Table 3 Panel B generally indicate that the personality traits do not influence of the distribution of financial assets for the sample of individuals holding such assets. The only personality trait, which does appear to have some influence across the three quantiles, is agreeableness, where the findings suggest an inverse effect across the financial asset distribution. Such findings suggest that, in general, personality traits may influence the holding of assets *per se* rather than the amount of assets held. We explore such issues further in the following section, where we focus on the influence of personality traits on the holding of debt and assets.

Analysis of the Type of Debt and Asset Holding

In Table 4, we present the results of the random effects probit analysis of the type of debt held, where the results for the aged over 18 sample are presented in Panel A and the results for the aged 30 to 65 sample are presented in Panel B. The random effects probit analysis of the probability of holding debt, irrespective of type, reveals that conscientiousness, that is being hard-working and achievement oriented, is inversely associated with holding unsecured debt, whilst the other four personality traits are positively associated with debt holding.

It is apparent that the influence of the personality traits differs by type of debt held. For example, focusing on the aged over 18 sample, conscientiousness and neuroticism are the only two personality traits that influence the probability of holding hire purchase agreements, typically used to spread the cost of purchasing goods such as cars and consumer durables over a specified time period, both of these personality traits having positive influences. Specifically, a one standard deviation increase in

conscientiousness (neuroticism) increases the probability of holding hire purchase debt by 3 (10) percentage points. Extraversion, on the other hand, is the only personality trait to influence the probability of holding a personal loan. The probability of having credit card debt is also positively influenced by extraversion, where a one standard deviation increase in extraversion increases the probability of having credit card debt by 9 percentage points. Conversely, conscientiousness has an inverse effect on the probability of having this type of debt.

Interestingly, the probability of having a loan from a private individual is positively associated with agreeableness and neuroticism, where such borrowing is the only type of debt to be influenced by agreeableness, which being related to being cooperative, forgiving and trusting is clearly associated with interpersonal skills. With respect to the effect of emotional stability, it is apparent that this factor has a relatively large effect here: a one standard deviation increase in neuroticism increases the probability of having a loan from a private individual by 24 percentage points. The probability of having an overdraft, arguably a relatively straightforward channel of credit to arrange, is positively influenced by extraversion, neuroticism and openness to experience with relatively large and highly statistically significant effects. For example, a one standard deviation increase in neuroticism increases the probability of having an overdraft by 18 percentage points. Conscientiousness, in contrast, exerts an inverse effect on the probability of having an overdraft, which re-enforces the notion that being hard-working and target-focused is associated with a lower probability of holding unsecured debt. Similarly, conscientiousness exerts a moderating influence on the probability of holding other types of debt, with extraversion serving to increase the probability of holding other types of debt. It is evident that a similar pattern of

results is found for the aged 30 to 65 sample, albeit with lower levels of statistical significance for some effects.

In Table 5, the random effects probit analysis of the probability of holding different types of financial assets is presented. Extraversion is found to have an inverse effect, whilst openness to experience is found to have a positive effect, on the probability of holding financial assets regardless of type. Again, it is apparent that the influence of the personality traits varies across the different types of financial assets. Focusing on the aged over 18 sample, the probability of holding national savings, arguably the least risky of the financial assets in terms of rate of return, is not influenced by any of the five personality traits. Similarly, the probability of having a unit trust does not appear to be influenced by any of the five personality traits. Such a finding may be related to that of national savings in that, with a unit trust, the risk has been spread by diversifying the investments: a fund manager invests in a range of companies and these investments are then pooled in a fund, thereby spreading the risk associated with the various shares, with individuals then purchasing units within the fund and receiving dividends or interest as determined by the performance of the constituent investments. In contrast, the probability of holding premium bonds is inversely associated with conscientiousness, extraversion and agreeableness and positively influenced by openness to experience, with a relatively large and highly statistically significant positive effect reflecting the importance of curiosity and creativity here. Interesting, with premium bonds, which are a financial product offered by the National Savings and Investments of the UK Government, instead of interest payments, investors have the chance to win tax-free prizes. Hence, this type of financial assets is quite distinct from the other assets in terms of its return.

Extraversion exerts an inverse effect on the probability of having a personal equity plan whilst having a positive influence on the probability of having other investments.

Finally, the probability of having stocks and shares, arguably the riskiest form of financial assets in terms of rate of return, is inversely associated with agreeableness and positively influenced by openness to experience. Specifically, a one standard deviation increase in agreeableness (openness to experience) decreases (increases) the probability of holding shares by 9.8 (8) percentage points. Interestingly, openness to experience has been found in the existing literature to be associated with self-employment, which is typically regarded as being characterised by risk tolerant individuals (see, for example, Parker, 2009). Hence, our findings associated with the relationship between openness to experience and the holding of stocks and shares tie in with this type of behaviour.

Again, a similar pattern of results is evident for the other age group although with lower levels of statistical significance observed for some of the effects. Overall, it is apparent that personality traits are important determinants of the type of debt and financial assets held, having distinct influences across the range of financial instruments.

4. Conclusion

In this paper, we have contributed to the small yet growing empirical literature analysing debt and financial assets at the household level. To be specific, we have focused on the influence of personality traits on the holding of unsecured debt and financial assets. We have adopted the Big Five personality trait taxonomy developed by Costa and McCrae (1992) to classify personality traits according to five factors: openness to experience, conscientiousness, extraversion, agreeableness and neuroticism.

Our findings suggest that some personality traits do influence the amount of unsecured debt and financial assets held by individuals. Specifically, we find that certain personality traits such as extraversion and openness to experience exert relatively large influences on the amount of debt and financial assets held. In contrast, extraversion has a relatively large inverse effect on the amount of financial assets held. Such findings suggest that personality traits such as extraversion have opposing influences on the levels of liabilities and assets held. In contrast, personality traits such as conscientiousness and neuroticism appear to be unimportant in influencing the amount of unsecured debt and financial asset holding, either positively or negatively. These effects exist after controlling for an extensive set of covariates that are commonly used in the literature to model household finances.

Interestingly, the results from the quantile analysis indicate that, with the exception of agreeableness, personality traits do not influence the distribution of the amount of financial assets amongst those individuals who hold such assets, suggesting that personality traits influence the holding of financial assets *per se* rather than the amount of assets held. This contrasts with the quantile regression analysis relating to unsecured debt where personality traits do appear to have some influence on the amount of unsecured debt for those individuals who hold such debt and the effects are apparent at different points of the distribution other than just at the mean.

With respect to the type of debt and assets held, the analysis suggests that personality traits have different effects across the various types of debt and assets. For example, extraversion is positively associated with the probability of holding credit card debt whilst conscientiousness is inversely associated with the probability of holding this type of debt. With respect to assets, openness to experience is not found to influence the probability of having national savings, arguably the least risky asset

in terms of return, but is found to increase the probability of holding stocks and shares, arguably the most risky asset to hold.

Overall, our empirical findings indicate that personality is an important influence on the aspects of individuals' economic and financial decision-making explored in this paper. Our paper thus contributes to the growing empirical literature on household finances furthering our understanding of the determinants of debt and asset holding, as well as, contributing more generally to the expanding literature exploring the implications of personality traits for economic outcomes.

References

Almlund, M., A. L. Duckworth, J. Heckman and T. Kautz (2011). Personality Psychology and Economics. IZA DP. Number 5500.

Bertaut, C. and M. Starr-McCluer (2002). Household Portfolios in the US. In '*Household Portfolios*' Guiso, L., Haliassos, M. and T. Jappelli (eds). MIT Press.

Borghans, L., A. L. Duckworth, J. J. Heckman and B. ter Weel (2008). The Economics and Psychology of Personality Traits. *Journal of Human Resources*, 43(4), 972-1059.

Brown, S., Garino, G., Taylor, K. and S. Wheatley Price (2005). Debt and Financial Expectations: An Individual and Household Level Analysis. *Economic Inquiry*, 43(1), 100-20.

Brown, S., Garino, G. and K. B. Taylor (2008). Mortgages and Financial Expectations: A Household Level Analysis. *Southern Economic Journal*, 74, 857-78.

Brown, S. and K. B. Taylor (2008). Household Debt and Financial Assets: Evidence from Germany, Great Britain and the USA. *Journal of the Royal Statistical Society*, *Series A*, 171(3), 615-643.

Browning, M. and A. Lusardi (1996). Household Saving: Micro Theories and Micro Facts. *Journal of Economic Literature*, 34(4), 1797-1855.

Caliendo, M, Fossen, F. and A. Kritikos (2011). Personality Characteristics and the Decision to Become and Stay Self-Employed. IZA DP. Number 5566.

Caspi, A., B. W. Roberts and R. L. Shiner (2005). Personality Development: Stability and Change. *Annual Review of Psychology*, 56, 453-484.

Cobb-Clark, D. and S. Schurer (2011a). Two Economists' Musings on the Stability of Locus of Control. IZA DP No. 5630.

Cobb-Clark, D. and S. Schurer (2011b). The Stability of Big-Five Personality Traits. IZA DP No. 5943.

Costa, P. T. and R. R. McCrae (1992). Revised NEO Personality Inventory (NEO-PI-R) and NEO Five Factor Inventory (NEO-FFI) Professional Manual. Odessa, FL: PAR.

Cox, D. and T. Jappelli (1993). The Effect of Borrowing Constraints on Consumer Liabilities. *Journal of Money*, *Credit and Finance*, 25, 197-213.

Crook, J. (2001). The Demand for Household Debt in the USA: Evidence from the 1995 Survey of Consumer Finance. *Applied Financial Economics*, 11, 83-91.

Gropp, R., Scholz, J.K. and M. J. White (1997). Personal Bankruptcy and Credit Supply and Demand. *Quarterly Journal of Economics*, 112, 217-51.

Guariglia, A. (2001). Saving Behaviour and Earnings Uncertainty: Evidence from the British Household Panel Survey. *Journal of Population Economics*, 14, 619-634.

Guiso, L., Haliassos, M. and T. Jappelli (2002). *Household Portfolios*, MIT Press.

Heineck, G. and S. Anger (2010). The Returns to Cognitive Skills Abilities and Personality Traits in Germany. *Labour Economics*, 17, 535-546.

Hochguertel, S., Alessie, R., and A. Van Soest (1997). Savings Accounts versus Stocks and Bonds in a Household Portfolio Allocation. *Scandinavian Journal of Economics*, 99(1), 81-97.

Koenker, R. and G. Bassett Jr. (1978). Regression Quantiles. *Econometrica*, 46, 33-50.

Koenker, R. and K. Hollock (2001). Quantile Regression. *Journal of Economic Perspectives*, 15,143-56.

Lusardi, A. (1998). On the Importance of the Precautionary Saving Motive. *American Economic Review, Papers and Proceedings*, 88(2), 449-453.

McCrae, R. and P. Costa (2006). The Stability of Personality: Observation and Evaluations. *Current Directions in Psychological Science*, 132, 1-25.

Nandi, A. and C. Nicoletti (2009). Explaining Personality Pay Gaps in the UK. Institute for Social and Economic Research, Working Paper Number 2009-22.

Parker, S. C. (2009). *The Economics of Entrepreneurship*. Cambridge University Press: Cambridge.

FIGURE 1: Natural Logarithm of Unsecured Debt – Debtors (i.e. $\ln\left(d_{hi}\right) > 0$)
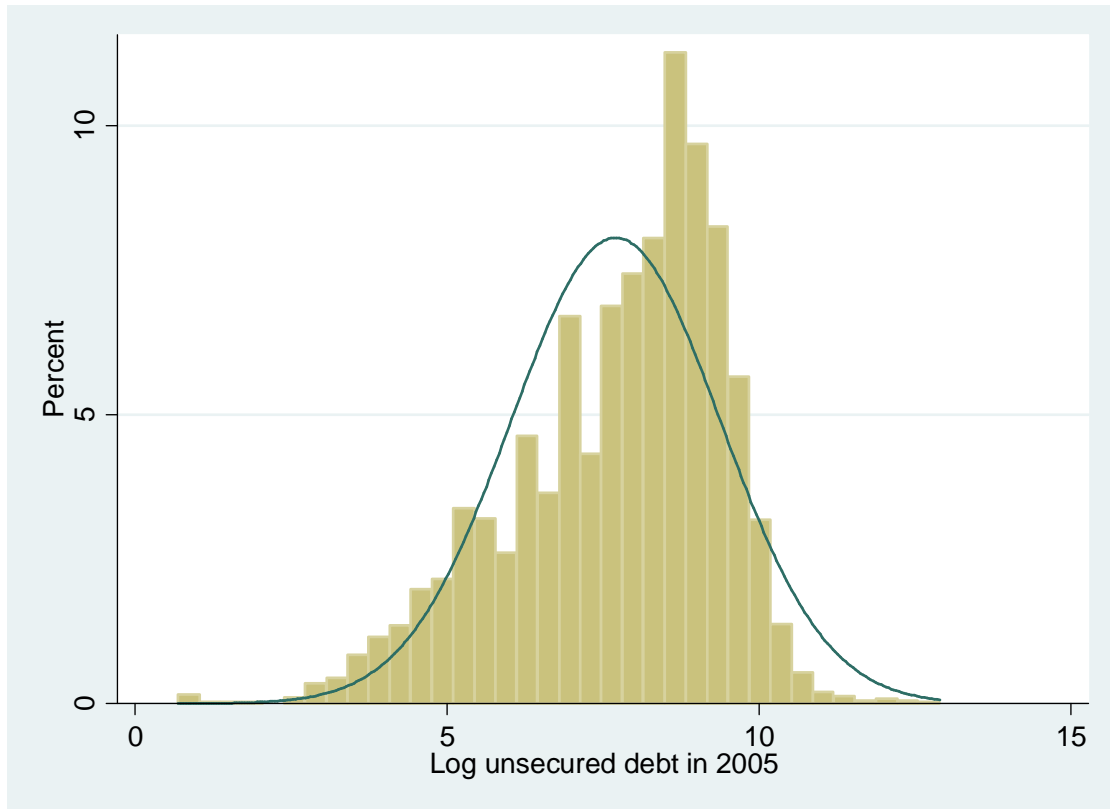
FIGURE 2: Natural Logarithm of Financial Assets – Asset Holders (i.e. $\ln\left(a_{hi}\right) > 0$)
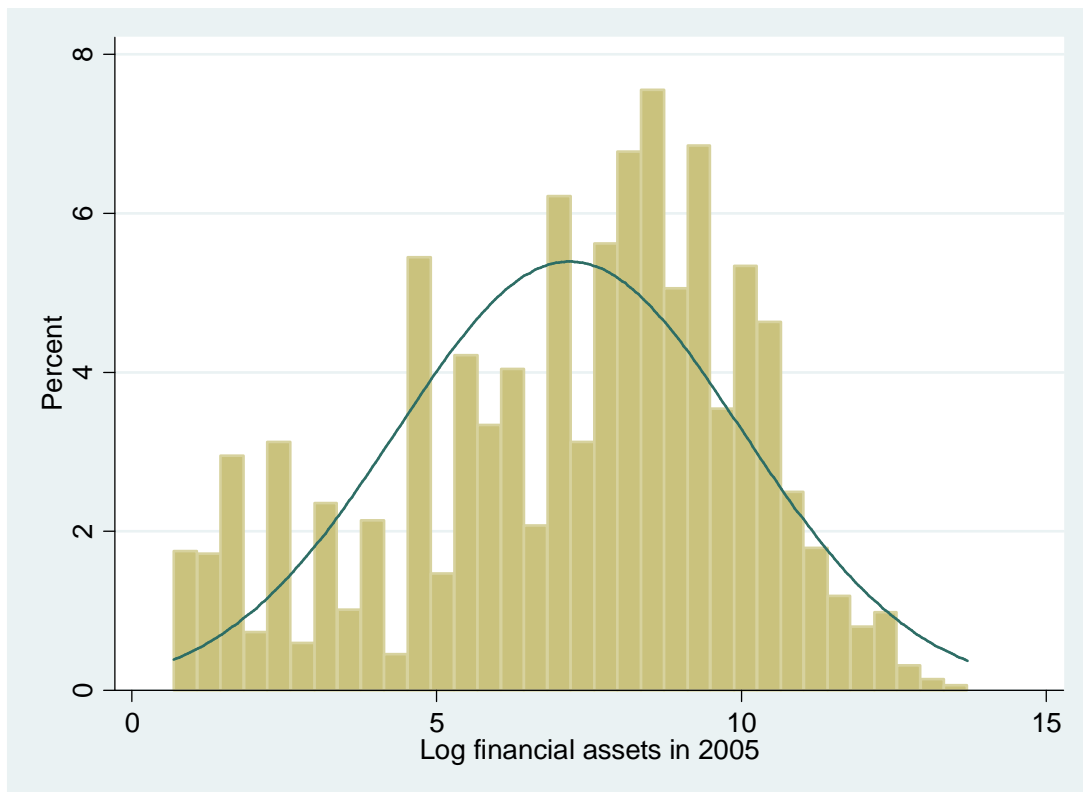
TABLE 1: Summary Statistics

	AGED OVER 18		AGED 30-65	
	Mean	Std. Dev.	Mean	Std. Dev
<u>Continuous Variables</u>				
$\ln(d_{hi})$	2.6126	3.7767	2.7312	3.8042
$\ln(a_{hi})$	1.5423	3.2273	1.7104	3.3554
Log total household labour income	7.8378	4.3053	9.0020	3.3456
Log total household non labour income	7.5057	2.8400	7.3478	2.7665
Log permanent household income	7.3523	1.4089	7.5415	1.1064
Number of Children	0.5902	0.9697	0.7543	1.0443
Number of adults	2.2528	0.9638	2.2517	0.8650
<u>Binary Variables</u>	<u>Proportions</u>			
Holding debt	0.3568		0.3390	
Hire Purchase Agreement	0.0764		0.0951	
Personal loan	0.1611		0.1813	
Credit card debt	0.1346		0.1565	
Loan from private individual	0.0100		0.0076	
Overdraft	0.0765		0.0681	
Other debt	0.1303		0.1068	
Holding assets	0.2372		0.2148	
National savings	0.0135		0.0102	
Premium bonds	0.1627		0.1715	
Unit trusts	0.0560		0.0621	
Personal equity plans	0.1086		0.1278	
Shares	0.1129		0.1300	
Other investments	0.0298		0.0305	
Male	0.4551		0.4556	
White	0.9740		0.9762	
Married/Cohabiting	0.6681		0.7817	
Employed	0.5334		0.6312	
Self-employed	0.0715		0.0975	
Degree	0.1494		0.1653	
Further Education	0.2885		0.3292	
A levels	0.1248		0.1025	
O levels	0.1561		0.1648	
Other qualification	0.0743		0.0699	
Health: excellent	0.2266		0.2360	
Health: good	0.4755		0.4779	
Health: fair	0.2083		0.1928	
Aged 18 to 29	0.1999		–	
Aged 30 to 39	0.1934		0.3061	
Aged 40 to 49	0.1946		0.3081	
Aged 50 to 59	0.1641		0.2597	
Aged 60 to 65	0.0797		0.1261	
Aged over 65	0.1682		–	
Own home outright	0.3014		0.2470	
Own home with mortgage	0.4632		0.5656	
Rent from council	0.1430		0.1230	
OBSERVATIONS	13,250		8,372	

TABLE 2: Random Effects Tobit Results: The Determinants of Debt and Financial Assets

PANEL A – Big 5 entered Simultaneously	AGED OVER 18				AGED 30 TO 65			
	DEBT		FINANCIAL ASSETS		DEBT		FINANCIAL ASSETS	
	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat
Intercept (β_0)	-9.3763	(-10.22)	19.7898	(-14.14)	-6.5537	(-5.02)	-22.9565	(-12.48)
Conscientiousness	**-0.0922**	**(-1.92)**	**-0.0220**	**(-0.54)**	**-0.1134**	**(-1.75)**	**-0.0524**	**(-0.96)**
Extraversion	**0.1894**	**(4.22)**	**-0.1302**	**(-3.53)**	**0.2179**	**(3.68)**	**-0.1519**	**(-3.13)**
Agreeableness	**0.1126**	**(2.43)**	**-0.0810**	**(-2.05)**	**0.1204**	**(1.92)**	**-0.0414**	**(-0.79)**
Neuroticism	**0.0817**	**(1.94)**	**-0.0477**	**(-1.34)**	**0.0978**	**(1.74)**	**-0.0242**	**(-0.51)**
Openness to experience	**0.1036**	**(2.35)**	**0.1547**	**(4.20)**	**0.1025**	**(1.73)**	**0.1691**	**(3.41)**
Male	0.2027	(3.34)	0.2345	(4.73)	0.3207	(4.00)	0.2664	(4.10)
White	0.7601	(3.81)	0.0101	(0.05)	0.9653	(3.33)	0.1840	(0.76)
Married	-0.0844	(-1.11)	0.3146	(4.57)	-0.5060	(-4.28)	0.3246	(3.14)
Age 18 to 29	2.8349	(16.50)	-1.2231	(-8.87)		–		–
Age 30 to 39	2.5882	(15.05)	-0.7362	(-5.55)	1.3266	(7.21)	-0.6595	(-4.64)
Age 40 to 49	2.1149	(12.63)	-0.2338	(-1.86)	0.7800	(4.36)	-0.1207	(-0.90)
Age 50 to 59	1.8537	(11.75)	-0.2200	(-1.96)	0.6559	(3.94)	-0.1048	(-0.89)
Age 60 to 65	1.1616	(6.77)	-0.1265	(-1.15)		–		–
Education: Degree	0.8738	(7.49)	1.2460	(12.75)	0.5395	(3.43)	1.4484	(10.79)
Education: Further	0.4102	(4.12)	0.8061	(9.66)	0.3207	(2.42)	0.8895	(7.47)
Education: A level	0.3622	(3.12)	0.7073	(6.86)	0.4252	(2.61)	0.8549	(5.92)
Education: O level	0.1142	(1.05)	0.6099	(6.51)	0.2053	(1.42)	0.7767	(5.95)
Education: other	0.0402	(0.29)	0.2723	(2.37)	0.0231	(0.13)	0.3210	(1.93)
Health excellent	-0.5557	(-4.46)	0.6179	(5.44)	-0.6634	(-4.05)	0.6514	(4.37)
Health good	-0.5209	(-4.58)	0.4854	(4.61)	-0.6629	(-4.45)	0.4895	(3.52)
Health fine	-0.2682	(-2.23)	0.3087	(2.78)	-0.4295	(-2.73)	0.2802	(1.89)
Employed	0.5367	(6.11)	0.2080	(2.64)	0.6480	(5.14)	0.1405	(1.38)
Self-employed	0.4255	(3.19)	0.0470	(0.42)	0.6057	(3.55)	-0.0280	(-0.20)
Log total household labour income	0.0256	(1.88)	0.0379	(3.36)	0.0210	(1.11)	0.0722	(4.56)
Log total household non labour income	-0.0137	(-1.01)	0.1551	(11.44)	-0.0200	(-1.10)	0.1830	(10.94)
Log permanent household income	-0.0395	(-1.93)	0.0965	(4.09)	-0.0489	(-1.32)	0.1219	(3.37)
Own home: no mortgage	-1.2296	(-9.12)	0.6556	(5.76)	-1.2372	(-6.25)	0.9935	(5.53)
Own home: with mortgage	-0.2509	(-2.16)	0.5138	(4.37)	0.0746	(0.43)	0.7044	(4.18)
Rent home from council	-0.2335	(-1.71)	-0.8270	(-5.47)	0.2275	(1.12)	-0.8415	(-3.80)
Number of Children	-0.0012	(-0.03)	-0.3101	(-7.65)	0.1215	(2.38)	-0.3391	(-7.18)
Household Size	-0.0307	(-0.74)	-0.3559	(-8.86)	0.0964	(1.62)	-0.4422	(-8.29)
ρ; p value	0.3173; p=[0.000]		0.4165; p=[0.000]		0.3597; p=[0.000]		0.4368; p=[0.000]	
σ; p value	6.7976; p=[0.000]		7.2968; p=[0.000]		6.7852; p=[0.000]		7.0239; p=[0.000]	
Wald Chi-Squared (31); p value	1584.71; p=[0.000]		1143.08; p=[0.000]		567.11; p=[0.000]		714.28; p=[0.000]	
OBSERVATIONS	13,250				8,372			

TABLE 2: Random Effects Tobit Results – Continued

PANEL B – Big 5 entered one at a time	AGED OVER 18		AGED 30 TO 65	
	DEBT	FINANCIAL ASSETS	DEBT	FINANCIAL ASSETS
	ME t-stat	ME t-stat	ME t-stat	ME t-stat
Conscientiousness	**-0.0029** *(-0.07)*	**-0.0266** *(-0.73)*	**-0.0160** *(-0.27)*	**-0.0460** *(-0.93)*
ρ; p value	0.3200; *p=[0.000]*	0.4158; *p=[0.000]*	0.3649; *p=[0.000]*	0.4375; *p=[0.000]*
Wald Chi-Squared (27) ; p value	1554.24; *p=[0.000]*	1124.74; *p=[0.000]*	542.51; *p=[0.000]*	702.85; *p=[0.000]*
Extraversion	**0.2012** *(4.77)*	**-0.0904** *(-2.61)*	**0.2254** *(4.07)*	**-0.1126** *(-2.48)*
ρ; p value	0.3197; *p=[0.000]*	0.4151; *p=[0.000]*	0.3633; *p=[0.000]*	0.4360; *p=[0.000]*
Wald Chi-Squared (27) ; p value	1571.21; *p=[0.000]*	1129.19; *p=[0.000]*	556.61; *p=[0.000]*	707.18; *p=[0.000]*
Agreeableness	**0.1170** *(2.76)*	**-0.0656** *(-1.83)*	**0.1217** *(2.12)*	**-0.0413** *(-0.86)*
ρ; p value	0.3200; *p=[0.000]*	0.4164; *p=[0.000]*	0.3647; *p=[0.000]*	0.4375; *p=[0.000]*
Wald Chi-Squared (27) ; p value	1559.89; *p=[0.000]*	1127.16; *p=[0.000]*	546.41; *p=[0.000]*	702.79; *p=[0.000]*
Neuroticism	**0.0349** *(0.85)*	**-0.0254** *(-0.73)*	**0.0476** *(0.87)*	**0.0040** *(0.09)*
ρ ; p value	0.3194; *p=[0.000]*	0.4166; *p=[0.000]*	0.3642; *p=[0.000]*	0.4378; *p=[0.000]*
Wald Chi-Squared (27) ; p value	1555.03; *p=[0.000]*	1124.31; *p=[0.000]*	543.21; *p=[0.000]*	702.08; *p=[0.000]*
Openness to experience	**0.1491** *(3.62)*	**0.1007** *(2.95)*	**0.1530** *(2.78)*	**0.1081** *(2.34)*
ρ; p value	0.3188; *p=[0.000]*	0.4172; *p=[0.000]*	0.3632; *p=[0.000]*	0.4392; *p=[0.000]*
Wald Chi-Squared (27) ; p value	1564.72; *p=[0.000]*	1128.89; *p=[0.000]*	549.87; *p=[0.000]*	704.42; *p=[0.000]*
OBSERVATIONS	13,250		8,372	

Note: The control variables in Panel B (not reported here for brevity) are as in Panel A.

TABLE 3: Quantile Regression: The Determinants of Unsecured Debt and Financial Assets

PANEL A – Debt	AGED OVER 18						AGED 30 TO 65					
	25th		50th		75th		25th		50th		75th	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Conscientiousness	**0.1533**	*(2.78)*	**0.1410**	*(3.69)*	**0.0593**	*(1.63)*	**0.1057**	*(1.38)*	**0.1424**	*(2.73)*	**0.0365**	*(0.94)*
Extraversion	**0.0483**	*(0.92)*	**0.0108**	*(0.30)*	**-0.0003**	*(0.01)*	**0.0612**	*(0.83)*	**-0.0066**	*(-0.14)*	**0.0066**	*(0.19)*
Agreeableness	**-0.1405**	*(-2.53)*	**-0.1450**	*(-4.04)*	**-0.0689**	*(-1.96)*	**-0.1345**	*(-1.66)*	**-0.1430**	*(-2.78)*	**-0.0623**	*(-1.65)*
Neuroticism	**0.0106**	*(0.21)*	**0.0830**	*(2.43)*	**0.0213**	*(0.67)*	**0.0448**	*(0.63)*	**0.0903**	*(1.95)*	**-0.0128**	*(-0.39)*
Openness to experience	**0.0573**	*(1.11)*	**0.1424**	*(3.98)*	**0.1166**	*(3.40)*	**0.0058**	*(0.08)*	**0.0563**	*(1.16)*	**0.1143**	*(3.11)*
Pseudo R-Squared	0.1234		0.1133		0.0824		0.1202		0.1018		0.0792	
OBSERVATIONS	4,492		4,492		4,492		2,987		2,987		2,987	

PANEL B – Assets	AGED OVER 18						AGED 30 TO 65					
	25th		50th		75th		25th		50th		75th	
	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat	Coef	t-stat
Conscientiousness	**-0.0243**	*(-0.18)*	**0.0776**	*(0.70)*	**0.0261**	*(0.36)*	**-0.1379**	*(0.63)*	**0.0533**	*(0.43)*	**-0.0646**	*(-0.72)*
Extraversion	**-0.0696**	*(-0.60)*	**-0.0190**	*(-0.19)*	**-0.0189**	*(-0.29)*	**-0.1268**	*(-0.66)*	**-0.0801**	*(-0.76)*	**-0.0194**	*(-0.26)*
Agreeableness	**-0.2293**	*(-1.81)*	**-0.1848**	*(-1.73)*	**-0.1830**	*(-2.67)*	**-0.0040**	*(-0.02)*	**-0.1530**	*(-1.33)*	**-0.1520**	*(-1.90)*
Neuroticism	**-0.1767**	*(-1.52)*	**-0.0412**	*(-0.42)*	**0.0423**	*(0.66)*	**-0.2607**	*(-1.39)*	**-0.1138**	*(-1.08)*	**0.0525**	*(0.70)*
Openness to experience	**0.1021**	*(0.87)*	**0.0382**	*(0.39)*	**0.0337**	*(0.52)*	**-0.0392**	*(-0.20)*	**-0.0406**	*(-0.38)*	**-0.0016**	*(-0.02)*
Pseudo R-Squared	0.0885		0.1000		0.1153		0.0955		0.0913		0.0970	
OBSERVATIONS	2,846		2,846		2,846		1,986		1,986		1,986	

Note: The control variables (not reported here for brevity) are as in Table 2 Panel A.

TABLE 4: Random Effects Probit Analysis: Type of Unsecured Debt

PANEL A AGED OVER 18	HOLDING DEBT		HIRE PURCHASE		PERSONAL LOAN		CREDIT CARD		PRIVATE INDIVIDUAL		OVERDRAFT		OTHER DEBT	
	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat
Conscientiousness	-0.0591	(-2.44)	0.0867	(2.58)	-0.0033	(-0.11)	-0.0725	(-2.32)	-0.1057	(-1.46)	-0.0955	(-2.50)	-0.0784	(-2.71)
Extraversion	0.0939	(4.17)	0.0403	(1.31)	0.0913	(3.34)	0.0840	(2.89)	0.0670	(0.95)	0.1646	(4.57)	0.0578	(2.12)
Agreeableness	0.0664	(2.86)	-0.0301	(-0.94)	0.0314	(1.12)	0.0105	(0.35)	0.1659	(2.25)	-0.0083	(-0.23)	0.0487	(1.74)
Neuroticism	0.0403	(1.91)	0.0769	(2.65)	0.0256	(1.00)	0.0199	(0.73)	0.1838	(2.82)	0.1398	(4.22)	0.0465	(1.84)
Openness to experience	0.0454	(2.06)	-0.0024	(-0.08)	0.0162	(0.60)	0.0427	(1.48)	-0.0071	(-0.10)	0.1503	(4.20)	0.0357	(1.34)
ρ; p value	0.3656;p=[0.000]		0.3208;p=[0.000]		0.3208;p=[0.000]		0.4299;p=[0.000]		0.3632;p=[0.000]		0.4380;p=[0.000]		0.2680;p=[0.000]	
Wald Chi-Squared (31)	1062.5;p=[0.000]		253.16;p=[0.000]		639.33;p=[0.000]		494.39;p=[0.000]		81.69;p=[0.000]		406.77;p=[0.000]		826.94;p=[0.000]	
OBSERVATIONS	13,250		13,250		13,250		13,250		13,250		13,250		13,250	
PANEL B AGED 30 TO 65	HOLDING DEBT		HIRE PURCHASE		PERSONAL LOAN		CREDIT CARD		PRIVATE INDIVIDUAL		OVERDRAFT		OTHER DEBT	
	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat
Conscientiousness	-0.0671	(-2.18)	0.0656	(1.55)	-0.0039	(-0.10)	-0.0925	(-2.26)	-0.1103	(0.72)	-0.1295	(-2.52)	-0.0550	(-1.45)
Extraversion	0.1028	(3.65)	0.0750	(1.94)	0.1027	(3.00)	0.0640	(1.73)	0.0698	(0.47)	0.1462	(3.07)	0.0932	(2.60)
Agreeableness	0.0677	(2.27)	-0.0317	(-0.78)	0.0316	(0.88)	-0.0094	(-0.24)	0.2401	(1.44)	-0.0322	(-0.66)	0.0090	(0.24)
Neuroticism	0.0466	(1.74)	0.1044	(2.85)	0.0375	(1.15)	0.0239	(0.67)	0.4550	(2.73)	0.1286	(2.87)	0.0709	(2.13)
Openness to experience	0.0455	(1.62)	-0.0074	(0.19)	0.0166	(0.48)	0.0849	(2.25)	-0.1523	(-1.00)	0.1643	(3.39)	-0.0115	(-0.33)
ρ; p value	0.4130;p=[0.000]		0.4248;p=[0.000]		0.4676;p=[0.000]		0.5332;p=[0.000]		0.7513;p=[0.000]		0.5097;p=[0.000]		0.2987;p=[0.000]	
Wald Chi-Squared (27)	491.80;p=[0.000]		128.29;p=[0.000]		314.41;p=[0.000]		243.88;p=[0.000]		21.01;p=[0.8250]		153.60;p=[0.000]		301.09;p=[0.000]	
OBSERVATIONS	8,372		8,372		8,372		8,372		8,372		8,372		8,372	

Note: The control variables (not reported here for brevity) are as in Table 2 Panel A.

TABLE 5: Random Effects Probit Analysis: Financial Asset Holding

PANEL A AGED OVER 18	HOLDING ASSETS		NATIONAL SAVINGS		PREMIUM BONDS		UNIT TRUSTS		PERSONAL EQUITY PLANS		SHARES		OTHER INVESTMENTS	
	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat
Conscientiousness	**-0.0213**	*(-0.76)*	**-0.0305**	*(-0.58)*	**-0.0751**	*(-2.45)*	**0.0128**	*(0.28)*	**0.0226**	*(0.64)*	**0.0057**	*(0.17)*	**-0.0409**	*(-0.78)*
Extraversion	**-0.0901**	*(-3.54)*	**-0.0288**	*(-0.84)*	**-0.0626**	*(-2.24)*	**0.0598**	*(1.42)*	**-0.0718**	*(-2.24)*	**-0.0595**	*(-1.97)*	**0.1411**	*(2.89)*
Agreeableness	**-0.0450**	*(-1.66)*	**-0.0432**	*(-0.84)*	**-0.0606**	*(-2.04)*	**-0.0519**	*(-1.17)*	**-0.0620**	*(-1.83)*	**-0.0971**	*(-3.07)*	**-0.0134**	*(-0.26)*
Neuroticism	**-0.0281**	*(-1.15)*	**0.0019**	*(0.04)*	**-0.0130**	*(-0.48)*	**0.0079**	*(0.19)*	**-0.0028**	*(-0.09)*	**0.0103**	*(0.35)*	**0.0387**	*(0.85)*
Openness to experience	**0.1034**	*(4.10)*	**0.0094**	*(0.20)*	**0.1047**	*(3.77)*	**0.0488**	*(1.17)*	**0.0547**	*(1.72)*	**0.0727**	*(2.41)*	**0.0672**	*(1.43)*
ρ; p value	0.4393;p=[0.000]		0.4150;p=[0.000]		0.4980;p=[0.000]		0.5181;p=[0.000]		0.4484;p=[0.000]		0.4094;p=[0.000]		0.4699;p=[0.000]	
Wald Chi-Squared (31)	1224.4;p=[0.000]		167.77;p=[0.000]		610.68;p=[0.000]		334.62;p=[0.000]		588.23;p=[0.000]		582.51;p=[0.000]		155.75;p=[0.000]	
OBSERVATIONS	13,250		13,250		13,250		13,250		13,250		13,250		13,250	

PANEL B AGED 30 TO 65	HOLDING ASSETS		NATIONAL SAVINGS		PREMIUM BONDS		UNIT TRUST		PERSONAL EQUITY PLANS		SHARES		OTHER INVESTMENTS	
	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat	ME	t-stat
Conscientiousness	**-0.0310**	*(-0.86)*	**0.0770**	*(1.03)*	**-0.0350**	*(-0.90)*	**0.0438**	*(0.72)*	**0.0253**	*(0.56)*	**0.0569**	*(1.37)*	**-0.1195**	*(-1.82)*
Extraversion	**-0.1015**	*(-3.17)*	**0.0140**	*(0.21)*	**-0.0634**	*(-1.84)*	**0.0593**	*(1.10)*	**-0.1039**	*(-2.59)*	**-0.0315**	*(-0.85)*	**0.0871**	*(1.46)*
Agreeableness	**-0.0269**	*(-0.78)*	**-0.1050**	*(-1.50)*	**-0.0711**	*(-1.92)*	**-0.0418**	*(-0.73)*	**-0.0590**	*(-1.38)*	**-0.1075**	*(-2.77)*	**-0.0102**	*(-0.16)*
Neuroticism	**-0.0060**	*(-0.19)*	**-0.0397**	*(-0.62)*	**-0.0148**	*(-0.44)*	**0.0140**	*(0.26)*	**-0.0183**	*(-0.47)*	**0.0208**	*(0.58)*	**-0.0115**	*(-0.20)*
Openness to experience	**0.1123**	*(3.44)*	**-0.1049**	*(-1.58)*	**0.1083**	*(3.08)*	**0.0595**	*(1.08)*	**0.0744**	*(1.82)*	**0.0512**	*(1.36)*	**0.0792**	*(1.33)*
ρ; p value	0.4610;p=[0.000]		0.4176;p=[0.000]		0.4731;p=[0.000]		0.5853;p=[0.000]		0.5080;p=[0.000]		0.4248;p=[0.000]		0.4516;p=[0.000]	
Wald Chi-Squared (27)	700.31;p=[0.000]		75.74;p=[0.000]		339.66;p=[0.000]		187.42;p=[0.000]		357.79;p=[0.000]		358.62;p=[0.000]		95.72;p=[0.000]	
OBSERVATIONS	8,372		8,372		8,372		8,372		8,372		8,372		8,372	

Note: The control variables (not reported here for brevity) are as in Table 2 Panel A.