



The role of personality traits in pension decisions: findings and policy recommendations

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ABSTRACT

Many countries need to stimulate pension participation and contribution to ensure their citizens are prepared adequately for retirement. Identifying at-risk groups with tendencies of not joining pension plans will help governments target strategies to improve pension awareness and participation. This study investigates the role of personality traits in pension decision making using data from the UK Household Longitudinal Study. Our results demonstrate that Extraversion significantly correlates with non-participation in private pensions, including both employer run and personal pensions. Individuals who are high in Conscientiousness are more likely to participate and pay more into personal pensions. Openness to experience is negatively correlated with saving via personal pensions. Agreeableness and Extraversion correlate inversely with the amount contributed to personal plans. This paper discusses our findings in detail and offers policy implications which may help promote pension participation and ease the problem of old age poverty.

KEYWORDS

Pension participation and contributions; economics and psychology; personality; government policy

JEL CLASSIFICATION

A12; D14; D91; J32

1. Introduction

While countries may have different forms of pension systems, most face similar challenges in stimulating pension participation and encouraging increased contribution to pension plans to ensure adequate retirement incomes among their citizens (OECD 2013). In the United Kingdom, pension participation among eligible employees reached its lowest level of 8.2 million individuals in 2011 since the 1950s and the number of individuals investing in personal pensions declined by 25% from 2007 to 2011 (Office for National Statistics 2013). UK respondents expect their retirement savings to last only for one-third of their retirement length and over sixty percent of respondents thought they might have to cut down on everyday spending to cope with shortfalls in retirement provision (Twigg 2013). A number of long running trends, such as increasing life expectancy without an accompanying increase in retirement age, may have exacerbated the problem of insufficient preparation for retirement (Crawford and O'Dea 2012).

There is sizable inequality in individual pension wealth in many counties. Much of the wealth is

accumulated through employer and personal pensions rather than state pensions (Banks et al. 2005). Workers with average incomes in the UK can expect to receive a state pension of only 29% of what they had been earning (OECD 2017). Relying on the state pension alone with a maximum payout of £164.35 per week (Department for Work and Pensions 2018) may not guarantee a comfortable retirement lifestyle to most individuals. By having employer and personal pensions, workers reap the financial benefits arising from employers' contributions and government tax relief on pension payments (Finance Act 2004). Identifying factors which contribute to non-participation in employer and personal pensions is therefore an important initial step towards growing individuals' retirement savings and improving retirees' financial state.

Previous research looking at possible determinants for individuals' decisions on pension participation focuses primarily on economic and demographic factors. Income and wealth are the most important determinants of occupational pension participation, alongside with age and job tenure (Huberman, Iyengar, and Jiang 2007). Holding other variables constant, women's pension

participation probability and contributions are higher than men (Bajtelsmit and Bernasek 1996). The design of the retirement plans, such as whether employers match employees' contributions, plays an important role in incentivising participation (Choi, Laibson, and Madrian 2004). Moreover, financially sophisticated employees are more likely to participate in retirement saving plan and improved knowledge of retirement planning helps employees' retirement preparation (Clark, Lusardi, and Mitchell 2017).

Behavioural economics theories, such as the theory of bounded rationality (Simon 1956), hyperbolic discounting theory (Loewenstein and Prelec 1992, Laibson 1997), and the behavioural life-cycle hypothesis (Shefrin and Thaler 1988), offer further theoretical and empirical insights into why individuals undersave for retirement (Dhimi 2016, Camerer, Loewenstein, and Rabin 2004). Bounded rationality emphasises that humans as limited information processors 'satisfice' rather than 'optimise' in decision making (Simon 1956). Individuals often use simple heuristics to make 'fast and frugal' decisions and their behaviour often systematically deviates from fully rational choices (Gigerenzer and Goldstein 1996, Gigerenzer and Selten 2002). In the context of saving decisions, bounded rationality stresses that individuals are limited by information and computational ability needed to determine their optimal level of saving (Brown, Chua, and Camerer 2009, Carroll 2001, Thaler and Benartzi 2004). Research shows that even though individuals tend to learn from errors caused by bounded rationality and improve on their saving decisions overtime, they still display a preference for immediate gratification (Brown, Chua, and Camerer 2009, Ballinger, Palumbo, and Wilcox 2003). This phenomenon of present-biased preferences can be explained by hyperbolic discounting functions which imply that the discount rates are not time-consistent but decline hyperbolically (Dhimi 2016, Angeletos et al. 2001). Such present-biased preferences cause self-control problems and hyperbolic agents procrastinate on saving for retirement (Thaler and Benartzi 2004, O'Donoghue and Rabin 1999). The behavioural life-cycle hypothesis (Shefrin and Thaler 1988) addresses the role of self-control problems in an individual's life time saving and consumption decisions. Relaxing assumptions

embedded under standard economic theories such as life-cycle theory (Modigliani and Brumberg 1954) and the permanent income model (Friedman 1957), the behavioural life-cycle hypothesis postulates that, in addition to standard economic and demographic features such as wealth and age, self-control is crucial in retirement saving decisions as immediate consumption is more attractive than saving for retirement. People often intend to save but lack the willpower to resist the temptation to spend. The magnitude of temptation to spend is account specific and frame dependent (Shefrin and Thaler 1988). Mental accounting and framing incorporated in the behavioural life-cycle hypothesis are manifestations of bounded rationality (Kahneman 2003, Dhimi 2016, Almlund, et al. 2011).

Following on from behavioural economics theories explaining why people often save inadequately, recent research examines the validity of various aspects of behavioural and psychological factors that may influence individual decisions on pension savings. For example, fearful emotions associated with old age might lead to repressing concerns of retirement, causing failure to save adequately for retirement (Taffler and Tuckett 2010). Inertia is observed among pension participants in their saving behaviour as the majority of participants adhere to default rules on pension enrolment (Madrian and Shea 2001). Optimistic individuals are less likely to participate in pensions (Balasuriya, Gough, and Vasileva 2014). Low levels of trust in financial institutions are linked to low pension participation (Agnew et al. 2012). Pension information obtained via social interaction with colleagues and peer influences may alter pension enrolment decisions (Duflo and Emmanuel 2003). Although these relatively scattered psychological factors recognised in previous studies offer meaningful insights into pension decisions from a behavioural perspective, pension participation and contribution have not been linked to a common taxonomy of internal individual differences such as the five-factor model of personality. An overarching objective of the present research is to better understand pension decisions through the lens of the five-factor personality model.

The five-factor personality model is the most comprehensive, systematic, and widely accepted taxonomy of personality traits to date (John, Naumann, and Soto 2008, John and Srivastava

1999, Rustichini et al. 2016). It measures Agreeableness, Conscientiousness, Extraversion, Neuroticism, and Openness to experience of a person (Costa and McCrae 1992). The validity of the five factors has been scrutinised, verifying that the domain of personality traits can be sufficiently described by these five factors (Digman 1990). In general, Extraversion is associated with reward sensitivity (Lucas et al. 2000), a preference for social attention (Ashton, Lee, and Paunonen 2002), positive affect (John, Naumann, and Soto 2008), and risk taking behaviour in various decision making domains (Nicholson et al. 2005, Lauriola and Levin 2001, McGhee et al. 2012). Openness to experience is generally believed to reflect the propensity of accepting challenges and new ideas (Costa and McCrae 1992) and is positively correlated with intelligence and achievement (Harris 2004, McCrae and Costa 2008, Önder et al. 2014, Douglas, Bore, and Munro 2016). Conscientiousness has been linked to perseverance, academic and career achievement, and industriousness (Roberts et al. 2004, Ziegler, Knogler, and Bühner 2009). Neuroticism is often related to anxiety, risk aversion and harm avoidance mechanisms (Paulus et al. 2003, Muris et al. 2005). Agreeableness is associated with being trusting, tolerant and cooperative (Costa and McCrae 1992, Hogan and Holland 2003). Agreeable people value positive interpersonal relationships, strive to minimise conflicts within groups (Blickle et al. 2008, Graziano, Jensen-Campbell, and Hair 1996) and follow the herd (Cingl 2013).

Personality factors are linked to constructs in the aforementioned behavioural economics models. For example, self-control, which plays a key role in household saving decisions modelled by the behavioural life-cycle hypothesis, can be measured by the self-discipline facet of Conscientiousness and the impulsiveness facet of Neuroticism (Costa and McCrae 1992). Deficiencies in self-control is conceptually and empirically related to low Conscientiousness, high Extraversion and high

Neuroticism (Costa and McCrae 1992, Aslan and Cheung-Blunden 2012, Whiteside and Lynam 2001, Jensen-Campbell et al. 2007). Present-biased preferences, captured with hyperbolic discounting models, are consistent with the behaviour of extraverts who adopt higher discounting rates and display preferences for immediate gratification (Ostaszewski 1996, Hirsh, Morisano, and Peterson 2008). In contrast, Conscientiousness is positively correlated with patience for delayed rewards (Manning et al. 2014, Mahalingam et al. 2014) and risk aversion (Borghans et al. 2008). The constraints individuals face in their ability to rationally process information and optimise, emphasised in bounded rationality as a reason for undersaving, may be mitigated by higher Conscientiousness as Conscientiousness is found to be a significant predictor for rational and reflective thinking as oppose to intuitive thinking (Witteman et al. 2009). On the other hand, Agreeableness, Extraversion, and Neuroticism are connected to engaging in intuitive or heuristic thinking styles (Sagiv et al. 2014, Pacini and Epstein 1999, Hilbig 2008). These studies demonstrate that aspects of personality traits are related to factors in behavioural economics theories. Recent research discusses the integration of personality traits and conventional preference parameters such as time and risk preferences (Borghans et al. 2008, Becker et al. 2012, Almlund, et al. 2011). Personality traits are likely to shape economic preferences (Borghans et al. 2008) and may influence economic outcomes through their effect on preferences (Rustichini et al. 2016).¹ Adding personality measures to models incorporating demographic characteristics substantially increases the predictive power of a model to explain economic behaviour (Rustichini et al. 2016).

Recent studies show close associations between personality traits and economic behaviour. Openness to experience is recognised as a main driver for excessive trading in the stock market (Kleine, Wagner, and Weller 2016). Openness to experience also explains pay gaps in the UK (Nandi and Nicoletti 2014) and higher gross

¹No consensus arose from previous studies regarding the correlations between personality traits and economic preferences (Almlund, et al. 2011). While Rustichini et al. (2016) find significant links between personality variables and preferences, others argue that personality traits and preferences play complementary roles in explaining heterogeneity in life outcomes (Becker et al. 2012). Note that the purpose of this paper is not to compare the respective effect of personality traits and preferences on economic behaviour. We agree that a deeper understanding of the complex connections between personality traits and economic decision making is needed (Rustichini et al. 2016) and future research should systematically integrate psychology into behavioural economics to form comprehensive models (Hodgson, forthcoming).

state productivity in the US (Yang and Lester 2016). Extraversion is found to have a positive influence on debt holding (Brown and Taylor 2014) but a negative correlation with national savings rates (Hirsh 2015). Conscientiousness is positively linked to savings and wealth (Kausel, Hansen, and Tapia 2016) but Agreeableness has a negative correlation with wealth (Mosca and McCrory 2016). Older adults who are high in Neuroticism and Agreeableness or low in Conscientiousness are more likely to receive financial help (Gillen and Kim 2014). Although personality has been linked to household finances as discussed, and with retirement well-being and satisfaction (Kesavayuth, Rosenman, and Zikos 2016, Robinson, Demetre, and Corney 2010), there is no published literature on how the Big Five personality traits link to participation in and contribution to pension plans prior to retirement. This paper attempts to address this issue and fill this void in the literature.

This study aims to contribute to economics literature by exploring whether the five factors of personality correlate with individuals' pension participation and contribution. Samples from the Understanding Society, the UK Household Longitudinal Study (UKHLS), are examined in order to establish correlations between pension participation and the Big Five personality traits. It is hypothesised that personality traits are correlated with pension decisions. In particular, we expect personality traits that promote risk-taking, Extraversion and Openness to experience (Lauriola and Levin 2001), would predict lower participation to pensions. Extraversion is also related to present-biased preferences (Hirsh, Morisano, and Peterson 2008), therefore extraverts may have a strong tendency to undersave for retirement. Conscientiousness, which is linked to better future planning (Hershey and Mowen 2000) and a greater preference for delayed rewards (Manning et al. 2014), is expected to be positively associated with pension participation and contribution. Agreeableness may link to lower pension participation and contribution as agreeable people save less and accumulate lower wealth (Nyhus and Webley 2001, Nabeshima and Seay 2015), experience greater financial hardship (Matz and Gladstone 2018), and are less interested in

investing in their own financial success (Judge, Livingston, and Hurst 2012). Neuroticism is often related to anxiety, risk averse and harm avoidance mechanisms (Paulus et al. 2003, Muris et al. 2005), therefore Neuroticism may be positively related to better retirement planning.

An important contribution of this research is finding the first evidence that personality traits help explain non-participation in private pensions controlled for demography, employment and wealth. Our policy implications tie closely with the nudge theory (Thaler and Sunstein 2008) which advocates designing effective policies to influence people's behaviour and promote the interest of the public. Utilising a well-accepted and common classification of personality attributes such as the Big Five model (Digman 1990) brings new insights into our understanding of psychological factors explaining heterogeneity in pension decisions as well as better identifying at-risk groups so that appropriate and practical strategies can be formulated to improve pension awareness and participation.

II. Data and methods

Data

Our research is based on data from the UK Household Longitudinal Study (UKHLS) (also known as Understanding Society). The UKHLS is a multi-purpose longitudinal study operated by the Institute for Social and Economic Research at the University of Essex. The UKHLS interviewed over 45,000 individuals every year between 2009 and 2014. Wave three relating to year 2011 is the only wave collecting information on the five factors of personality. Information on private pension participation is available in wave two, four, and six, relating to years 2010, 2012, and 2014 respectively. We match individuals interviewed in 2010, 2012, and 2014 with their personality scores from 2011, assuming that personality is time invariant over a period of a few years (Cobb-Clark and Schurer 2012). Although there is a debate in psychology literature on the stability of personality traits across an individual's life span (Caspi and Roberts 2001, Roberts and DelVecchio 2000, Lucas and Donnellan 2011), prior studies

evaluate the stability of personality traits in the UKHLS and suggest that personality traits remain stable for at least several years (Busic-Sontic, Czap, and Fuerst 2017, Brown and Taylor 2014). In this research, we extract a sample of the working population aged between 18 and 65 from these waves and use 49,161 valid observations (23,211 unique individuals) to study the association between personality traits and pension decisions.²

Pension participation and contributions

We explore whether personality is linked to pension participation by using four binary dependent variables:

- (1) Non-participation in private pensions (either an employer run pension or a personal pension) is used as a dependent variable in our regression analysis. If a respondent reports herself as neither being a member of an employer's pension scheme nor contributing regularly to any personal pension, the dependent variable for non-participation is coded as one, and coded as zero otherwise. Analysis using this binary variable provides an overview on how personality traits may explain non-participation in private pensions.
- (2) We then investigate how personality may relate to a more comprehensive level of pension participation by using a dependent variable labelled as 'participation in both employer and personal pensions,' coded as one if a respondent describes herself as being a member of both employer and personal pensions, and coded as zero if otherwise.
- (3) We look into individuals' decisions on whether to participate in employers' pensions when these schemes are available to them. The binary dependent variable for employer run pension participation is coded as one if a respondent claims to be a member of employer pension plans. Compared to personal pension participation, where individuals have to reach out to pension operators, the process of joining employers' pensions is more straightforward. Employers' pension schemes provide the financial benefit of additional

contributions made by employers into workers' pension pots. People who do not actively seek to pay into personal pensions maybe attracted by both the convenience of participating and the economic benefits offered by employer run pensions.

- (4) Finally, we use information on whether an individual contributes to personal pensions on a regular basis as our last binary dependent variable which is coded as one if there is regular contribution to these schemes. We use the dependent variables described in (3) and (4) for analysis to differentiate between a person's subscribed pension type as different traits may affect the decision on joining employer run pensions or personal pensions.

While in the UK the contribution rates for employer run pensions are usually determined in proportion to worker's salary and are restricted by the agreement between employees and employers, the amount contributed into personal pensions can be decided by individuals in accordance to their own preferences, restricted only by a capped amount that is eligible for tax relief (up to £40,000 currently). We use information on the amount of regular payments into personal pension schemes as a dependent variable to investigate whether the Big Five factors correlate with the level of personal pension contribution in our ordinary least squares (OLS) regression.

Personality measures

Participants in the UKHLS completed the BFI-S, a 15-item version of the Big Five Inventory (John, Donahue, and Kentle 1991, Gerlitz and Schupp 2005), which contains fifteen questions measuring the Big Five personality traits of a respondent with three questions on each factor. Respondents were required to rate themselves on a 7 point scale from '1- Does not apply' to '7 - Applies to me perfectly' for each question. Detailed questions measuring each personality trait are displayed in Table 1. In our sample, the Cronbach's α reliability scores across the personality traits are 0.58 (Agreeableness), 0.53 (Conscientiousness), 0.61 (Extraversion), 0.71 (Neuroticism), and 0.65 (Openness to experience). These Cronbach's α reliability scores appear to be

²In the UK, men currently reach state pension age at 65. For women, the state pension age will rise to 65 in November 2018.

low because each trait was measured based on only three items. However, this should not be of major concern and the BFI-S is still considered to be valid (Tavares 2010).

Apart from the benefit of parsimony, the BFI-S shows internal consistency (Gerlitz and Schupp 2005) and strong correlation with the well-established original BFI (Donnellan and Lucas 2008). The BFI-S can be considered as a reliable short measure of the five factor personality especially when fuller versions of the five factor inventory are unsuitable to be used as standard measures in panel surveys (Hahn, Gottschling, and Spinath 2012). Compared to its original 44-item Big Five Inventory and other Big Five questionnaires containing even more questions such as the 240 NEO Personality Inventory (Costa and McCrae 1992), the BFI-S satisfies the time constraints many large panel surveys encounter and makes it possible to measure respondents personality when respondents also need to answer a vast number of other questions on various life aspects in these surveys (Hahn, Gottschling, and Spinath 2012). We standardise our five factor personality scores to mean zero and standard deviation of one in regressions.

Empirical specification

To explore factors influencing decisions on pension participation and contribution, we estimate a series of models corresponding to different assumptions regarding the existence and effects of unobserved variables (Wilson 2015) with specifications for probit models and ordinary least

squares (OLS) models respectively. Probit models are employed to explore correlations between respondents' personality and whether or not they participate in pension plans. The models follow the form:

$$P_{it} = \begin{cases} 1, & P_{it}^* > 0 \\ 0, & \text{otherwise} \end{cases} \quad P_{it}^* = X_{it}\beta + Z_i\alpha + \mu_i + \varepsilon_{it} \quad (1)$$

where i indexes individuals and t denotes the time of observation, P_{it}^* is an unobserved latent dependent variable with a corresponding observable binary response P_{it} , X_{it} are time-varying demographic and socio-economic characteristics assumed to be associated with pension participation, Z_i are time-invariant characteristics including personality traits, and μ_i and ε_{it} represent individual heterogeneity that is not captured by personality and the stochastic error term respectively.

We then investigate the effect of personality on the amount a respondent regularly invests into personal pension plans by defining the OLS model as follows:

$$\ln(Y_{it}) = X_{it}\delta + Z_i\eta + v_i + \varepsilon_{it} \quad (2)$$

where i and t denote individuals and time of observation, Y_{it} indicates the amount one pays into private pension scheme, X_{it} are time-varying demographic and socio-economic characteristics assumed to be related to pension contributions, Z_i are time-invariant characteristics including personality traits, and v_i and ε_{it} represent individual heterogeneity that is not captured by personality and the stochastic error term respectively.

Table 1. Questions related to big five personality traits in UKHLS (wave 3).

Big Five personality traits	Questions: "Please tick the number which best describes how you see yourself where 1 means 'does not apply to me at all' and 7 means 'applies to me perfectly'.
Agreeableness	I see myself as someone who ... is sometimes rude to others (A1 score reversed) has a forgiving nature (A2) considerate & kind (A3)
Conscientiousness	does a thorough job (C1) tends to be lazy (C2 score reversed) does things efficiently (C3)
Extraversion	is talkative (E1) is outgoing, sociable (E2) is reserved (E3 score reversed)
Neuroticism	gets nervous easily (N1) worries a lot (N2) is relaxed, handles stress well (N3 score reversed)
Openness to experience	is original, come up with ideas (O1) values artistic, aesthetic experie (O2) has an active imagination (O3)

As a starting point, we employ cross-sectional estimations assuming that personality traits serve as proxies for unobserved individual difference and may capture the individual heterogeneity which correlates with other explanatory variables (Busic-Sontic, Czap, and Fuerst 2017, Heineck and Anger 2010). Although the potential influence of remaining individual heterogeneity is precluded in these regressions, the results serve as a benchmark and provide basis for discussion, relating our findings on the role of personality to results from prior research that analyse cross-sectional data (Guido 2006, Ziegler, Knogler, and Bühner 2009, Witteman et al. 2009, Hirsh, Morisano, and Peterson 2008, Matz and Gladstone 2018). Regressions within each wave also enable us to observe potential changes in the effect of personality traits on pension participation when the implementation of the workplace pension auto-enrolment policy progressed during the analysed time period.

We then consider the possible effect of previously uncaptured person-specific heterogeneity may have on individuals' economic outcomes in the panel. We use random effects regressions with the assumption of individual heterogeneity being uncorrelated with other regressors. To further control for the potential correlation between remaining personal effects and the other variables, fixed effects models are considered. However, using a standard fixed effects probit or OLS model in investigating the role of personality may pose problems. The fixed effects models which partial out time invariant variables would make it impossible to obtain estimates for constant personality features (Kesavayuth, Rosenman, and Zikos 2016).

One solution to address the possible correlation between unobserved heterogeneity and other regressors while at the same time, investigating time invariant personality causes of the dependent variables is to incorporate the Mundlak fixed effects method (Mundlak 1978, Wilson 2015). We adjust our models by defining the nature of μ_i and v_i as follows:

$$\mu_i = \bar{X}_i\gamma + \omega_i \quad (3)$$

$$v_i = \bar{X}_i\Psi + \partial_i \quad (4)$$

where \bar{X}_i is a vector of covariates representing the individual means of time-varying variables and ω_i and ∂_i denotes the remaining stochastic error terms. Under the Mundlak function, the estimator of β , α , δ and η approximate standard panel fixed effects estimators (Mundlak 1978, Brown and Taylor 2014). Thus the probit models with fixed effects specifications follow the form:

$$P_{it} = \begin{cases} 1, & P_{it}^* > 0 \\ 0, & \text{otherwise} \end{cases} \quad P_{it}^* = X_{it}\beta + Z_i\alpha + \bar{X}_i\gamma + \omega_i + \varepsilon_{it} \quad (5)$$

The OLS model, considering fixed effects, is defined as follows:

$$\ln(Y_{it}) = X_{it}\delta + Z_i\eta + \bar{X}_i\Psi + \partial_i + \varepsilon_{it} \quad (6)$$

Basic control variables included in our regressions are age, gender, race, marital status, finance related occupation (used as a proxy for respondents' financial sophistication), educational attainment, and wealth related variables such as income and home value. These demographic characteristics have been used as explanatory variables for pension decisions (Beshears et al. 2015, Madrian and Shea 2001, Clark, Lusardi, and Mitchell 2017). Similar to previous literature, the demographic variables in this study are measured at the individual level. However, in order to account for household features such as the influence of other household members' financial situation has on an individual's decisions, we use household income instead of individual income in the robustness checks of our results.

III. Results and discussion

Descriptive statistics

Table 2 reports descriptive statistics of our sample containing all working individuals aged between 18 and 65 interviewed in the 2010, 2012, and 2014 waves used in this study. 43% of working individuals do not save via private pensions at all. 67% of the respondents have employer run pension schemes available to them. When employer's pensions are provided, 78% individuals choose to participate in these schemes. The majority do not invest in personal pensions. The average age in our sample is 42 and 47% are male. 46% of the respondents have

Table 2. Summary statistics on all variables for working respondents aged between 18 and 65.

	Working individuals (2010, 2012 and 2014)				
	Mean	Std. dev.	Min	Max	Obs
Agreeableness	5.6136	0.9676	1	7	49,161
Conscientiousness	5.5867	0.9760	1	7	49,161
Extraversion	4.6400	1.2342	1	7	49,161
Neuroticism	3.5479	1.3291	1	7	49,161
Openness to experience	4.6390	1.1859	1	7	49,161
Have both employer and personal pensions	0.0326	0.1777	0	1	49,161
Have at least one type of prive pension (employer or personal)	0.5694	0.4952	0	1	49,161
Not having any private pension (employer or personal)	0.4306	0.4952	0	1	49,161
Employer pension scheme available	0.6663	0.4715	0	1	49,161
Participation in employer run pension if available	0.7779	0.4157	0	1	32,726
Participation in personal pension	0.0842	0.2777	0	1	49,161
Amount contributed into personal pension (ln)	3.3943	4.0260	0	7	4,141
Age	42.776	11.325	18	65	49,161
Male	0.4654	0.4988	0	1	49,161
White	0.8817	0.3229	0	1	49,161
Married or cohabiting	0.7327	0.4426	0	1	49,161
Finance related occupation	0.0646	0.2459	0	1	49,161
Education: degree or equivalent or higher	0.4614	0.4985	0	1	49,161
Annual individual income (ln)	9.9752	9.6647	0	12	49,161
House value (ln)	12.172	12.793	0	17	49,161

	Wave 2 (2010)		Wave 4 (2012)		Wave 6 (2014)	
	Mean	Obs	Mean	Obs	Mean	Obs
Agreeableness	5.6135	18,147	5.6148	17,192	5.6122	13,822
Conscientiousness	5.6018	18,147	5.5896	17,192	5.5632	13,822
Extraversion	4.6267	18,147	4.6430	17,192	4.6537	13,822
Neuroticism	3.5309	18,147	3.5438	17,192	3.5753	13,822
Openness to experience	4.6233	18,147	4.6376	17,192	4.6613	13,822
Have both employer and personal pensions	0.0324	18,147	0.0297	17,192	0.0365	13,822
Have at least one type of prive pension (employer or personal)	0.5414	18,147	0.5400	17,192	0.6428	13,822
Not having any private pension (employer or personal)	0.4586	18,147	0.4600	17,192	0.3572	13,822
Employer pension scheme available	0.6527	18,147	0.6490	17,192	0.7056	13,822
Participation in employer run pension if available	0.7372	11,840	0.7561	11,150	0.8521	9,736
Participation in personal pension	0.0927	18,147	0.0793	17,192	0.0791	13,822
Amount contributed into personal pension (ln)	3.3507	1,683	3.4105	1,364	3.4388	1,094
Age	42.270	18,147	42.629	17,192	43.624	13,822
Male	0.4686	18,147	0.4642	17,192	0.4627	13,822
White	0.8863	18,147	0.8802	17,192	0.8776	13,822
Married or cohabiting	0.7391	18,147	0.7284	17,192	0.7295	13,822
Finance related occupation	0.0638	18,147	0.0639	17,192	0.0668	13,822
Education: degree or equivalent or higher	0.4433	18,147	0.4632	17,192	0.4829	13,822
Annual individual income (ln)	9.9532	18,147	9.9612	17,192	10.020	13,822
House value (ln)	12.158	18,147	12.151	17,192	12.216	13,822

at least undergraduate degrees or other types of higher degrees, such as diplomas, teaching or medical qualifications. The average individual income is £21,486, the natural logarithm of which is 9.98. The average house value is £193,326 of which the natural logarithm is 12.17. We then look at breakdowns of the summary statistics based on data from each wave. An upward trend of employer pension participation can be observed. 71% of employers provided pension plans in 2014 compared to 65% in 2010. When these pensions are available, the rate of participation has also gone up from 73% in 2010 to 85% in 2014. On the other hand, investment in personal pensions experienced a slightly drop from 9.3% in 2010 to 7.9% in

2014. Working individuals who have neither employer run pensions nor personal pensions have decreased by 10% from 2010 to 2014.

Personality and participation in private pensions

We carry out a series of probit regressions to estimate correlations between personality and pension participation using the baseline models in this section. Variance Inflation Factors on coefficients are lower than 1.4 in our regressions indicating that there is no significant multicollinearity (Kutner, Nachtsheim, and Neter 2004). Table 3 shows the regression results on the relationships between personality and (1) not saving in any private pensions, or (2) saving into both employer

Table 3. Probit regression results for personality and pension participation.

	Non-participation in private pensions (no employer or personal pension) (1)		Participation in both employer and personal pensions (2)	
	Coef.	S.E.	Coef.	S.E.
A: Wave 2 (2010)				
Age	-0.015 ***	0.001	0.016 ***	0.002
Male	-0.072 ***	0.025	-0.028	0.043
White	-0.319 ***	0.037	0.141 **	0.069
Married or cohabiting	-0.134 ***	0.026	0.018	0.047
Finance related occupation	-0.096 **	0.045	0.061	0.073
Edu: degree or equivalent or higher	-0.323 ***	0.024	0.181 ***	0.042
Annual individual income (ln)	-0.331 ***	0.019	0.345 ***	0.036
House value (ln)	-0.039 ***	0.002	0.015 ***	0.005
Employer pension scheme available	-1.809 ***	0.025		
Agreeableness	-0.015	0.012	-0.024	0.021
Conscientiousness	-0.040 ***	0.013	0.028	0.023
Extraversion	0.039 ***	0.012	-0.040 *	0.021
Neuroticism	-0.009	0.012	-0.005	0.022
Openness to experience	0.021	0.013	-0.030	0.022
Pseudo R ²	0.347		0.065	
Chi ²	0.000		0.000	
N	18,147		18,147	
B: Wave 4 (2012)				
	Coef.	S.E.	Coef.	S.E.
Age	-0.015 ***	0.001	0.016 ***	0.002
Male	-0.022	0.026	0.040	0.045
White	-0.214 ***	0.037	0.072	0.069
Married or cohabiting	-0.159 ***	0.027	-0.006	0.049
Finance related occupation	-0.097 **	0.048	0.054	0.078
Edu: degree or equivalent or higher	-0.286 ***	0.025	0.076 *	0.044
Annual individual income (ln)	-0.321 ***	0.021	0.341 ***	0.038
House value (ln)	-0.036 ***	0.002	0.022 ***	0.005
Employer pension scheme available	-1.939 ***	0.027		
Agreeableness	0.000	0.013	-0.035	0.022
Conscientiousness	-0.024 *	0.014	-0.002	0.024
Extraversion	0.036 ***	0.013	-0.017	0.022
Neuroticism	0.009	0.013	0.030	0.023
Openness to experience	0.001	0.014	0.025	0.023
Pseudo R ²	0.374		0.063	
Chi ²	0.000		0.000	
N	17,192		17,192	
C: Wave 6 (2014)				
	Coef.	S.E.	Coef.	S.E.
Age	-0.011 ***	0.001	0.016 ***	0.002
Male	-0.171 ***	0.031	0.108 **	0.047
White	-0.181 ***	0.043	0.192 **	0.076
Married or cohabiting	-0.204 ***	0.032	-0.052	0.051
Finance related occupation	-0.092	0.057	0.159 **	0.075
Edu: degree or equivalent or higher	-0.275 ***	0.030	0.039	0.045
Annual individual income (ln)	-0.208 ***	0.021	0.307 ***	0.040
House value (ln)	-0.024 ***	0.003	0.027 ***	0.005
Employer pension scheme available	-2.291 ***	0.032		
Agreeableness	0.017	0.016	-0.031	0.023
Conscientiousness	-0.039 **	0.016	0.009	0.025
Extraversion	0.015	0.015	-0.052 **	0.023
Neuroticism	0.013	0.015	-0.017	0.024
Openness to experience	0.002	0.016	-0.028	0.024
Pseudo R ²	0.433		0.065	
Chi ²	0.000		0.000	
N	13,822		13,822	

Note that *, ** and *** stands for significance at the 0.1, 0.05, and 0.01 levels or better respectively. The five-factor personality scores are standardised to mean zero and standard deviation of one. In column (1), the dependent variable is one for those who have not participated in any private pension schemes. In column (2), the dependent variable is one if respondents invested in both employer and personal pensions.

and personal pensions. Results show age, being white or level of education is significantly negatively correlated with non-participation in private pension plans. The availability of employers'

pensions is pivotal to pension participation in at least one forms of private pension. Unsurprisingly, wealth proxies such as income or having more expensive homes significantly negatively correlate

with non-pension participation. Among personality measures, Extraversion is positively related to non-participation while Conscientiousness is negatively related to non-participation (column (1)). The effect of Conscientiousness on non-participation remains consistent throughout our samples. The positive correlation between Extraversion and non-participation remains positive but became statistically insignificant in 2014, which might have reflected the desirable effect of the recent automatic enrolment policy on increasing overall pension participation in the UK. By using participation in both employer and personal pensions as a dependent variable (column (2)), we find Extraversion is inversely correlated with joining in both forms of pensions in some years.

After obtaining an overview on how personality may explain private pension participation, it would be of interest to differentiate between different types of private pensions. Regression results on whether personality correlates with saving via employer's pensions and personal pensions respectively are reported respectively in column (1) and (2) in Table 4. Extraversion significantly reduces the chances of participating in employer run and personal pensions. Conscientiousness is positively and Openness is negatively correlated with personal pension participation. Agreeable individuals tend to invest in employer run pensions but not in personal pensions. Neuroticism does not link to pension participation significantly. We observe that the statistical significance of personality's influence on employer run pension participation diminishes in 2014, suggesting that the effect of individual personality characteristics may have been minimised with the implementation of workplace pension automatic enrolment. The role of personality in an individual's personal pension participation becomes more prominent after the launch of auto-enrolment into employer run pension schemes. The results also show females are less likely than males to invest in personal pensions but more likely to join employers' pensions. Workers who have employer pension schemes are less likely to invest in personal pensions and vice versa. Therefore employer run pensions and personal pensions are likely to be viewed as substitutes from a worker's point of view.

We find evidence in Tables 3 and 4 that Extraversion significantly correlates with non-participation in both employers' and personal

pension schemes. This is of concern as extravert individuals, who tend not to save up via employers' pension schemes, also have the tendency to have no savings in a personal pension. A number of underlying reasons might account for why extravert participants do not to save via pensions. Extraversion is found to predict risk-taking behaviour (Lauriola and Levin 2001) and relate to positive affect (Costa and McCrae 1980). Non-participation in pension schemes is a riskier financial strategy than the decision to save up sufficiently. People who are risk averse might prefer to save regularly into pensions to provide financial certainty and stability for retirement. Extraverts, who are risk seeking and react to positive emotions, may not worry about retirement and leave saving for old age too late.

Research shows Extraversion is correlated with low national savings rates (Hirsh 2015) and larger unsecured debt (Brown and Taylor 2014). Our study extends previous findings on the role of Extraversion in the critical economic decision of saving into a pension. Compared to usual savings, pensions are targeted at saving for retirement specifically and are enhanced by employers' contribution and government tax allowances. Pension savings require regular instalments and are usually inaccessible for a substantial number of years and can only be unlocked at the age of 55 without being penalised in the UK (HM Treasury 2014). The delay of benefiting from the utility of pensions is much more significant than that from usual savings, which means in order to save up in pensions, individuals need to be more determined to resist the temptation of immediate consumption. This does not seem to be compatible with the characteristics of extraverts. Extraverts display a tendency to pursue immediate gratification and sensitivity to instant rewards (Hirsh, Morisano, and Peterson 2008). Saving up in pensions means that individuals will not be able to enjoy the utility of funds until much later in life, which may not be an attractive idea to extraverts. Extraversion is also associated with being sociable (Eysenck and Eysenck 1985) and being influenced by other people's consumption patterns (Brandstätter and GÜth 2000). Extraverts are more prone to hedonic consumption behaviour (Guido 2006). An increase in current spending will naturally have an impact on the amount left to be saved. Risk seeking propensity is compounded by a tendency to enjoy immediate spending

Table 4. Probit regression results for personality and participation in employer and personal pensions.

	Participation in employer run pensions (1)		Participation in personal pensions (2)	
	Coef.	S.E.	Coef.	S.E.
A: Wave 2 (2010)				
Age	0.014 ***	0.001	0.017 ***	0.001
Male	−0.121 ***	0.029	0.239 ***	0.030
White	0.268 ***	0.042	0.280 ***	0.051
Married or cohabiting	0.155 ***	0.030	0.045	0.034
Finance related occupation	0.132 **	0.052	0.009	0.056
Edu: degree or equivalent or higher	0.336 ***	0.029	0.128 ***	0.030
Annual individual income (ln)	0.540 ***	0.029	0.200 ***	0.021
House value (ln)	0.034 ***	0.003	0.031 ***	0.003
Participation in employer run pension			−0.456 ***	0.029
Participation in personal pension	−0.345 ***	0.050		
Agreeableness	0.025 *	0.015	−0.018	0.015
Conscientiousness	0.014	0.016	0.059 ***	0.017
Extraversion	−0.045 ***	0.015	−0.020 **	0.015
Neuroticism	0.021	0.015	−0.006	0.015
Openness to experience	−0.002	0.015	−0.035 **	0.016
Pseudo R ²	0.103		0.081	
Chi ²	0.000		0.000	
N	11,840		18,147	
B: Wave 4 (2012)				
	Coef.	S.E.	Coef.	S.E.
Age	0.014 ***	0.001	0.018 ***	0.001
Male	−0.138 ***	0.030	0.242 ***	0.033
White	0.132 ***	0.042	0.253 ***	0.054
Married or cohabiting	0.181 ***	0.031	0.020	0.036
Finance related occupation	0.132 **	0.055	0.023	0.060
Edu: degree or equivalent or higher	0.327 ***	0.029	0.047	0.032
Annual individual income (ln)	0.437 ***	0.029	0.192 ***	0.024
House value (ln)	0.030 ***	0.003	0.038 ***	0.004
Participation in employer run pension			−0.390 ***	0.031
Participation in personal pension	−0.208 ***	0.057		
Agreeableness	0.020	0.015	−0.048 ***	0.016
Conscientiousness	0.008	0.016	0.028	0.018
Extraversion	−0.036 **	0.015	−0.016	0.016
Neuroticism	0.001	0.015	−0.003	0.017
Openness to experience	0.014	0.016	0.003	0.017
Pseudo R ²	0.090		0.081	
Chi ²	0.000		0.000	
N	11,150		17,192	
C: Wave 6 (2014)				
	Coef.	S.E.	Coef.	S.E.
Age	0.006 ***	0.002	0.019 ***	0.002
Male	0.021	0.036	0.292 ***	0.036
White	0.089 *	0.049	0.321 ***	0.062
Married or cohabiting	0.251 ***	0.036	−0.009	0.040
Finance related occupation	0.160 **	0.066	0.038	0.066
Edu: degree or equivalent or higher	0.228 ***	0.035	0.112 ***	0.035
Annual individual income (ln)	0.458 ***	0.034	0.100 ***	0.022
House value (ln)	0.017 ***	0.003	0.036 ***	0.004
Participation in employer run pension			−0.385 ***	0.034
Participation in personal pension	−0.206 ***	0.068		
Agreeableness	−0.001	0.018	−0.038 **	0.018
Conscientiousness	0.019	0.019	0.038 *	0.020
Extraversion	−0.019	0.018	−0.026 **	0.018
Neuroticism	−0.012	0.018	−0.005	0.018
Openness to experience	0.025	0.019	−0.034 *	0.019
Pseudo R ²	0.070		0.082	
Chi ²	0.000		0.000	
N	9,736		13,822	

Note that *, ** and *** stands for significance at the 0.1, 0.05, and 0.01 levels or better respectively. The five-factor personality scores are standardised to mean zero and standard deviation of one. In column (1), the dependent variable is one for respondents who participated in employer run pension schemes conditioned on employer pensions being available to respondents. The dependent variable is one for those who participated in personal pensions in column (2). Participation in employer run pensions and participation in personal pensions are dummy variables and used as control variables in our regression analysis for column (2) and (1) respectively.

rather than delaying gratification which probably explains why extraversion significantly reduces the likelihood of saving into pensions.

Personality and the amount paid into personal pensions

After investigating individuals' decisions on whether to participate in pension schemes, another aspect to consider is whether personality correlates with contribution level regularly paid into personal pension schemes. Table 5 reports the results of our linear regression analysis and reveals that when respondents pay into personal pensions on a regular basis, Agreeableness and Extraversion are significantly negatively correlated with the level of the payment made into personal pension plans, while Conscientiousness is associated with contribution into personal pensions.

Our results show Agreeableness is inversely correlated with the amount invested in personal pensions in Table 5 and saving regularly into personal pensions in Table 4. Agreeableness is associated with the tendency to be tolerant and to get along with others (Costa and McCrae 1992), to place less value on money (Matz and Gladstone 2018), and is linked to refraining from saving and investing in bonds and stocks (Brown and Taylor 2014, Duckworth and Weir 2010). Agreeable people are often motivated by the desire to maintain harmonious interpersonal relationship and thus are prone to conform to the social norm (Russo and Amnå 2016, Jensen-Campbell et al. 2002). Over 90% of the interviewees do not have personal pensions indicating it is much more common for people not to have personal pensions than to have one. Agreeable individuals' pursuit to adapt to what may be considered as the social norm may explain the reason for their low payment into personal pensions. The reluctance of agreeable individuals to pay into personal pensions may also be explained by the caring and compliant nature of agreeable people, prioritising what others want rather than their own needs, and therefore being less motivated to plan for their own future. Paying more into pensions often means a reduction in consumption in other life domains including expenditure on their household or family members, which may contribute

to the lack of drive in saving for oneself via personal pension schemes among agreeable individuals.

We also establish that Conscientiousness significantly positively correlates with pension participation, in particular personal pension participation in Tables 4 and 5. Conscientious people might be more pro-active in seeking suitable pension options and taking effective steps to secure their post retirement financial well-being by investing in personal pensions. Results on Conscientiousness are consistent with previous findings that Conscientiousness is linked to industrious and responsible behaviour (Ziegler, Knogler, and Bühner 2009), patience for delayed rewards (Manning et al. 2014), and rational thinking (Witteman et al. 2009). Conscientiousness has a positive correlation with pension participation across our regressions and significantly correlates with the amount invested into personal pensions. These findings imply conscientious individuals tend to be mindful of future planning in the area of pension participation and are more active in securing savings via personal pension schemes than people low in this trait.

Panel results

In the previous section, personality is assumed to explain unique individual differences. Therefore potential unobserved heterogeneity is unaccounted for in our cross-sectional analysis. In this section, we adopt a panel approach and use random effects models in our estimations, followed by employing the Mundlak (1978) fixed effects model. This approach further explores the potential impact of unobserved information uncaptured by personality in our panel estimation. Results reported in Table 6 suggest that our main findings on personality in Tables 3–5 are robust with consistent signs for all significant coefficients. Taking into account the unobservable heterogeneity using random effects models and Mundlak fixed effects specifications, personality is still able to explain pension decisions. Extraversion is consistently associated with pension non-participation while Conscientiousness promotes participation. Agreeable individuals have a tendency to join employers' pensions but refrain from investing in personal pensions.

Table 5. OLS regression results for personality and the amount paid into personal pensions.

	Regular contribution to personal pensions		
	B	S.E.	β
A: Wave 2 (2010)			
Age	0.012	0.002	0.105 ***
Male	0.381	0.050	0.181 ***
White	0.058	0.091	0.014
Married or cohabiting	-0.014	0.057	-0.006
Finance related occupation	0.114	0.093	0.026
Edu: degree or equivalent or higher	0.517	0.048	0.251 ***
Annual individual income (ln)	0.270	0.027	0.225 ***
House value (ln)	0.035	0.006	0.135 ***
Participation in employer run pension	-0.294	0.048	-0.136 ***
Agreeableness	-0.039	0.025	-0.037
Conscientiousness	0.061	0.028	0.052 **
Extraversion	-0.061	0.024	-0.059 **
Neuroticism	0.000	0.025	0.000
Openness to experience	0.048	0.026	0.043 *
Adj. R^2	0.227		
N	1,683		
B: Wave 4 (2012)			
	B	S.E.	β
Age	0.009	0.003	0.071 ***
Male	0.283	0.060	0.128 ***
White	0.021	0.105	0.005
Married or cohabiting	-0.055	0.065	-0.021
Finance related occupation	0.101	0.110	0.022
Edu: degree or equivalent or higher	0.473	0.056	0.219 ***
Annual individual income (ln)	0.333	0.035	0.246 ***
House value (ln)	0.042	0.007	0.146 ***
Participation in employer run pension	-0.361	0.055	-0.162 ***
Agreeableness	-0.120	0.029	-0.108 ***
Conscientiousness	0.060	0.032	0.050 *
Extraversion	-0.053	0.029	-0.049 *
Neuroticism	-0.020	0.029	-0.017
Openness to experience	0.034	0.030	0.029
Adj. R^2	0.220		
N	1,364		
C: Wave 6 (2014)			
	B	S.E.	β
Age	0.010	0.004	0.076 ***
Male	0.412	0.069	0.181 ***
White	0.134	0.132	0.028
Married or cohabiting	-0.046	0.079	-0.017
Finance related occupation	0.008	0.125	0.002
Edu: degree or equivalent or higher	0.563	0.064	0.254 ***
Annual individual income (ln)	0.172	0.032	0.156 ***
House value (ln)	0.038	0.008	0.131 ***
Participation in employer run pension	-0.288	0.063	-0.129 ***
Agreeableness	-0.098	0.036	-0.082 ***
Conscientiousness	0.107	0.038	0.085 ***
Extraversion	-0.046	0.033	-0.041
Neuroticism	-0.022	0.035	-0.018
Openness to experience	0.005	0.036	0.004
Adj. R^2	0.181		
N	1,094		

Note that *, ** and *** stands for significance at the 0.1, 0.05, and 0.01 levels or better respectively. The five-factor personality scores are standardised to mean zero and standard deviation of one. OLS regression is performed using the logarithmic amount paid into personal pensions (standardised to a weekly basis) as the dependent variable. These regressions are performed among participants who pay regularly into personal pensions.

Openness to experience correlates negatively with participation in personal pensions.

Robustness checks

In Table 7 we check the robustness of our results by (A) replacing individual income with

household income as a proxy to capture the impact household features might have on individual pension decisions. Our panel results show that Extraversion remains the most robust predictor for pension non-participation and lower level of contribution into personal pension plans. In line with previous findings, we observe

Table 6. Regression analysis with (A) random effects models and (B) Mundlak fixed effects models for pension participation and contributions.

	Non-participation (1)		Participation in both pensions (2)		Participation in employer run pensions (3)		Participation in personal pensions (4)		Amount of contribution into personal pensions (5)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
<i>A: Random effects estimates</i>										
Agreeableness	0.004	0.023	−0.064 *	0.033	0.018	0.028	−0.067 **	0.030	−0.075 ***	0.022
Conscientiousness	−0.091 ***	0.024	0.051	0.036	0.047	0.029	0.128 ***	0.032	0.095 ***	0.023
Extraversion	0.071 ***	0.023	−0.087 **	0.032	−0.097 ***	0.027	−0.049 *	0.029	−0.060 **	0.021
Neuroticism	0.021	0.023	−0.027	0.034	−0.014	0.028	−0.027	0.030	0.015	0.021
Openness to experience	0.037	0.024	−0.035	0.034	0.026	0.029	−0.076 **	0.031	0.026	0.022
χ^2	0.000		0.000		0.000		0.000		0.000	
N	49,161		49,161		32,726		49,161		4,141	
<i>B: Mundlak fixed effects estimates</i>										
Agreeableness	−0.020	0.023	−0.045	0.034	0.047 *	0.027	−0.048	0.030	−0.062 ***	0.021
Conscientiousness	−0.061 **	0.024	0.029	0.036	0.008	0.029	0.105 ***	0.032	0.075 ***	0.023
Extraversion	0.077 ***	0.022	−0.085 ***	0.033	−0.098 ***	0.027	−0.052 *	0.029	−0.058 ***	0.020
Neuroticism	−0.003	0.023	−0.014	0.034	0.019	0.027	−0.013	0.030	0.017	0.021
Openness to experience	0.039 *	0.023	−0.039	0.035	0.016	0.028	−0.077 **	0.031	0.026	0.022
χ^2	0.000		0.000		0.000		0.000		0.000	
N	49,161		49,161		32,726		49,161		4,141	

Note that *, ** and *** stands for significance at the 0.1, 0.05, and 0.01 levels or better respectively. The five-factor personality scores are standardised to mean zero and standard deviation of one. Coefficients for control variables are not reported for brevity. Probit regressions are used from column (1) to (4). In column (1), the dependent variable is one for those who have not participated in any private pension schemes. In column (2), the dependent variable is one if respondents invested in both employer and personal pensions. The dependent variable is one for respondents who participated in employer run pension schemes conditioned on employer pensions being available to respondents in column (3). In column (4), the dependent variable is one for those who participated in personal pensions. OLS regression is performed using the logarithmic amount of contribution into personal pensions as the dependent variable in column (5).

conscientious individuals are more likely to have paid into pensions, while agreeable individuals are less likely to contribute more into personal plans. (B) We then extract a sample of employees who were earning less than £10,000 per annum or were under 22 years old. Individuals in this sample are usually not eligible for automatic enrolment into workplace pensions. Therefore any potential influences from personality may affect this group more than individuals who qualified for the default enrolment under the new government policy. Results generated in this sample show Extraversion still predicts low contributions in personal pensions. Conscientious employees have a tendency to join employers' pensions. Agreeable individuals who do not qualify for auto-enrolment are more likely to invest in personal pensions. Openness is related to non-participation in pensions.

IV. Policy recommendations and conclusion

The aim of this study is to understand what personality factors contribute to pension participation and contribution. Our research proposes a number of

policy recommendations on increasing pension participation within and beyond a UK context. The consequences of failing to take advantages of pension schemes designed explicitly to boost retirement savings can be detrimental for post-retirement financial well-being. Our results suggest that personality traits influence pension participation and therefore an approach to help increase participation in both employers' pensions and personal pensions is to target at-risk groups. We suggest policy makers emphasise the importance of planning for retirement and highlight the risks associated with inadequate saving for retirement by approaching low participation groups identified in this paper, such as extraverts, who could end up with no savings in both employers' and personal pensions. Hirsh, Kang, and Bodenhausen (2012) find evidence that a persuasive message can be made more appealing in a product advertisement by personalising the wording of the message to match an audience's personality. We also suggest that media-buying to promote pension awareness and pension products should be focused on channels that low pension participation populations identified in this paper are more likely to visit. For example, in this paper we discover that

Table 7. Regression results for personality and pension decisions (A) considering household influence and (B) among respondents non-eligible for automatic enrolment.

	Non-participation (1)		Participation in both pensions (2)		Participation in employer run pensions (3)		Participation in personal pensions (4)		Amount of contribution into personal pensions (5)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
<i>A: Household income as a control variable</i>										
Agreeableness	-0.021	0.023	-0.045	0.033	0.046 *	0.027	-0.048	0.030	-0.062 ***	0.021
Conscientiousness	-0.060 **	0.024	0.030	0.036	0.007	0.029	0.105 ***	0.032	0.075 ***	0.023
Extraversion	0.076 ***	0.022	-0.087 ***	0.033	-0.098 ***	0.027	-0.053 *	0.029	-0.059 ***	0.020
Neuroticism	-0.002	0.023	-0.013	0.034	0.018	0.027	-0.012	0.030	0.018	0.021
Openness to experience	0.039 *	0.023	-0.040	0.035	0.018	0.028	-0.078 **	0.031	0.025	0.022
<i>Chi²</i>	0.000		0.000		0.000		0.000		0.000	
<i>N</i>	49,161		49,161		32,726		49,161		4,141	
<i>B: Employees not eligible for auto-enrolment</i>										
Agreeableness	-0.097 *	0.055	0.063	0.137	0.082	0.077	0.130 *	0.078	0.006	0.066
Conscientiousness	-0.128 **	0.057	-0.136	0.136	0.154 *	0.079	0.011	0.078	0.003	0.067
Extraversion	0.092 *	0.054	-0.039	0.129	-0.100	0.076	-0.115	0.072	-0.113 *	0.065
Neuroticism	0.007	0.052	-0.078	0.129	-0.036	0.073	-0.004	0.071	-0.017	0.059
Openness to experience	0.095 *	0.053	-0.096	0.129	-0.065	0.076	-0.130 *	0.072	0.105 *	0.062
<i>Chi²</i>	0.000		0.003		0.000		0.000		0.000	
<i>N</i>	9,978		9,978		5,523		9,978		375	

Note that *, ** and *** stands for significance at the 0.1, 0.05, and 0.01 levels or better respectively. The five-factor personality scores are standardised to mean zero and standard deviation of one. Coefficients for control variables are not reported for brevity. Probit regressions are used from column (1) to (4). In column (1), the dependent variable is one for those who have not participated in any private pension schemes. In column (2), the dependent variable is one if respondents invested in both employer and personal pensions. The dependent variable is one for respondents who participated in employer run pension schemes conditioned on employer pensions being available to respondents in column (3). In column (4), the dependent variable is one for those who participated in personal pensions. OLS regression is performed using the logarithmic amount of contribution into personal pensions as the dependent variable in column (5).

extraverts have low pension participation and prior research shows that extraverts are more likely to engage in gambling activities (Mishra et al. 2011). Therefore, policy makers and pension providers would be able to more efficiently target low pension participation individuals using a limited marketing budget by distributing pension information on gambling related websites and physical premises with advertising copy designed to attract the attention of extraverts.

Another approach is to inform all individuals of the influence of personality on pension participation. Individuals may not take a comprehensive personality test, but those who identify themselves as 'considerate and kind', described in the BFI-S statement as an indication of high in Agreeableness, or 'outgoing and sociable' signalling high Extraversion, should be aware that these traits may mean they have a tendency of not saving or saving insufficiently via pension plans. It is possible to further disseminate our main findings via channels such as social media (Nicholas and Rowlands 2011) to promote such awareness at an individual level, targeting

individuals identified as Extravert and Agreeable based on their social media behaviour. Cultivating a general awareness of the role of personality in pension decisions and promoting pension education via tailored advertising channels may be particularly beneficial to enhance retirement preparation among citizens living in countries with pension systems that rely heavily on individuals' voluntary pension contributions.

Finally, as our results suggest that personality traits impact upon pension participation, we support automatic enrolment into employers' pension schemes which could increase the availability of employer pensions and reduce the effects of psychological factors contributing to pension non-participation. The British government's recent Automatic Enrolment Regulations 2013 No. 2556 legislation requires employers to automatically enrol employees who earn more than £10,000 per annum into a workplace pension scheme by 2018. Prior research indicates that mandatory workplace pension provision improves pension coverage (Nunes 2018). However the problem of low participation may still remain among certain groups as

only eligible workers would benefit from the new auto-enrolment policy and this policy does not account for personal pension investment. We conduct additional regression analysis on workers who were not eligible for auto-enrolment and our results show that people who are high in Openness and Extraversion but low in Conscientiousness and Agreeableness tend not to invest in pensions. We suggest widening the coverage of auto-enrolment by further reducing the automatic enrolment qualifying threshold to encourage saving habits and increase pension awareness among low earners. There are three times as many female low earners as male low earners in this sample. If the automatic enrolment qualifying threshold is reduced, more low earners, especially women, will benefit from saving regularly for retirement.

Given the context of widening pension deficits driven by economic factors and rising life expectancies (Ralph 2016) and fiscal pressures on government spending on pension in many rapidly ageing societies (de Mello et al. 2017), some may argue that income from pension schemes is not as secure as expected. Extended research could investigate this issue by examining if individuals still consider that pensions are an effective way to save for retirement. Future research could also investigate whether personality correlates with opting-out from employers' pensions after the completion of the auto-enrolment process in the UK.

To conclude, our study enriches recent literature on the role of personally traits in individuals' economic behaviour and provides evidence to both individuals and policy makers on how individual personality differences might impact on pension savings decisions. We examine the correlations between personality traits and pension participation and contribution using large scale survey data. Our research reveals that Extraversion is linked to non-participation in employer and personal pension plans. Conscientiousness increases while Openness reduces the chances of participating in personal pensions. Conscientious individuals tend to invest more in personal pensions but Agreeableness and Extraversion are negatively correlated with the amount an individual contributes to these pension schemes. Personality helps to explain participation decisions in personal pensions across all survey waves we study. Correlations between personality

and employer pension participation are significant before the commencement of automatic enrolment in the UK. Based on our findings, we suggest that targeting at-risk groups identified in this study, promoting public awareness, and a universal approach of extending the coverage of automatic enrolment into employers' pension plans may help to increase individuals' pension savings and protect their financial well-being after retirement. Policy implications of our study could extend beyond the context of widening pension participation within the UK and our findings may also be of particular interest to countries that have not yet adopted a workplace pension automatic enrolment policy.

Data availability statement

Raw data are available at UK data archive (<http://www.data-archive.ac.uk/>). Derived data supporting the findings of this study are available from the corresponding author on request.

Disclosure statement

No potential conflict of interest was reported by the authors.

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