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The Role of Personality in Household Saving and Borrowing Behaviour

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Abstract

The purpose of this paper is to investigate the extent to which personality influences saving and borrowing behaviour. We do this by exploiting a Dutch data set, which provides both detailed information on households' assets and debt as well as answers to two different personality inventories (the 16PA and the FFPI). Our findings are in line with previous investigations on the role of personality for saving. We found that the personality factors emotional stability, autonomy, and extraversion were robust predictors of saving and borrowing behaviour. Agreeableness, inflexibility, and tough-mindedness could explain certain types of saving. The inclusion of the personality factors significantly increased the explained variance in saving. The results suggest that when studying the effect of psychological variables on saving it is fruitful to divide saving into saving categories that differ with respect to the psychological mechanisms governing them. We also found that a partner's personality could contribute to predicting saving behaviour, which means that data should be collected from both heads of the households and their partners in multi-person households. Copyright © 2001 John Wiley & Sons, Ltd.

INTRODUCTION

The purpose of this paper is to investigate the role of personality in household saving and borrowing behaviour. In recent years, economic psychologists have carried out many studies of the effect of various psychological variables on saving (e.g. Daniel, 1997; Groenland, 1999; Lunt and Livingstone, 1991; Wahlund and Gunnarsson, 1996; Wärneryd, 1996a). Most of this work has been concerned with the influence of variables such as attitudes, saving motives, and time preferences and there has been much less attention paid to the role that personality factors may play. This is somewhat surprising

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given that links between saving behaviour and personality were first identified over 30 years ago (Kline, unpublished PhD thesis; Schmölders, 1966).

The study of saving has naturally been dominated by economists (see Browning and Lusardi, 1996, and Wärneryd, 1999, for thorough reviews), who, as well as putting forward a number of theories of saving, have clarified what should be considered saving. Saving is defined as the difference between net worth at the end of the period and the net worth at the beginning of the period, which should equal the excess of income over consumption expenditure in the same period (Wärneryd, 1999). It might be thought that this is straightforward to measure, but it is not. When trying to investigate the effect of psychological variables on saving we should consider whether different forms of saving are likely to be affected by different underlying psychological mechanisms. First, we need to consider the time period involved. An individual who saves 5% of his or her income each month for a year and then spends it all on a holiday has saved nothing over the year but has clearly saved (and saved regularly) if the accounting period is a month or a quarter. The time period matters. We would hypothesize that saving over comparatively short time periods (one to two years) would reflect a rather different personality than saving over long periods (ten to 20 years), which may be oriented much less to specific goals. Second, we should consider in which manner a household chooses to save. While most people think of putting money in a bank account as saving, economists also include mortgages and loans, the value of real estate and valuables, and investments in insurance, shares, mutual funds, etc in the definition of saving. Putting a sum of money towards a mortgage is economically equivalent to putting the same amount into a bank account. These two saving acts might, however, reveal different preferences or abilities to delay gratification. People who save before buying are more able to delay gratification than those who prefer to buy first and pay afterwards. Similarly, people buying insurance might have a different attitude to risk than people investing the same amount buying shares. Third, it might be fruitful to take into account that saving may be involuntary (having money left over in a bank account at the end of a month) or voluntary. Deliberately putting a sum aside each month is economically equivalent to having the same sum left over, but it is not necessarily the same psychologically. We would expect that putting money aside was more typical among self-disciplined people.

What kind of personality dimensions might be relevant to these different kinds of saving behaviour? The Big-Five dimensions (Digman, 1990) provide a framework for considering this issue and a few previous investigations give some insight about the relationship between personality and saving. Two early attempts are those of Schmölders (1966)[1] and Kline (unpublished PhD thesis). Schmölders analysed data from a representative sample ($N = 1050$) of West-German households, and reported that both attitudes towards saving as well as actual saving behaviour were deeply rooted in personality structure. Conscientious, self-disciplined people, compared to easy going, carefree people, were three times as often regular savers and saved on average 10–12% of their incomes compared to 5–7% of the opposite type of person. From a very different kind of theoretical perspective, Kline (unpublished PhD thesis) included a number of items about saving behaviour in his measure of the 'anal character', and these correlated well with the rest of the scale.

Brandstätter (1996) found that the three dimensions 'emotional stability', 'introversion' and 'conscientiousness' are related to saving (measured as self-reported saving the

[1]Reported in Brandstätter (1996).

previous year). He did not propose direct relationships between these factors and saving, but argued that the personality factors will predominantly influence saving attitudes, which will then influence saving behaviour. He also proposed specific interaction effects between the factors. For example, he suggested that extraversion causes a larger difference in saving with emotionally unstable subjects than with emotionally stable subjects. Conscientiousness is also assumed to dampen the influence of extraversion on saving. In the empirical analyses, Brandstätter found that couples who scored high on conscientiousness found saving attractive, and more so if they were also introverted. However, when saving attitudes were included in the model, conscientiousness lost its impact. Brandstätter also found that the relationship between saving attitudes and actual saving was stronger among introverts than extraverts.

In a recent experiment by Brandstätter and Güth (1998), they found that extraversion, emotional stability, and self-control could predict behaviour in a computerized multi-period 'saving game'. They found that people high on self-control had a greater tendency to average payoff across the 12 runs of the experiment while those low on self-control more often chose the random selection of one run. They did not use the dimensions 'extraversion' and 'emotional stability' to predict saving, but used them to predict reactions to inappropriate saving decisions or 'punishment' (having saved much in the first periods and getting a short life or having saved little in the first periods and getting a long life). They found that introverts and emotionally unstable people reacted more strongly than extraverts and stable people when deciding how much to spend in the future period after the information about length of life (and thereby the appropriateness of previous saving decisions) was given. Emotionally unstable introverts were the most sensitive to punishment, while the emotionally stable extraverts were the least sensitive.

Wärneryd (1996b) linked the concept of thrift, which has been considered a stable personal characteristic important for saving, to the personality dimension 'conscientiousness'. Using Brandstätter's 16PA (a short measure of Cattell's personality dimensions) he found that conscientiousness was the most important personality dimension associated with financial self-control, which is important for both saving and borrowing behaviour. Wärneryd used saving motives, saving attitudes, and saving behaviour as dependent variables and found that 'conscientiousness' and 'inflexibility' (which corresponds to agreeableness) were significantly related to saving behaviour and intention to save. The strength of the relationship was mediated by saving attitudes. Saving attitudes were also associated with saving motives, which had no direct influence on saving. Overall, different personality traits correlated significantly with different attitude factors, saving motives, and saving behaviour. The results were, however, not always easy to interpret, as the directions of the relationships in some cases were opposite from what was expected.

Hence, previous investigations show that there are good reasons to expect that personality dimensions might be important for saving behaviour. Conscientiousness is related to traits such as planning, self-discipline, and ability to delay gratification. Conscientiousness might therefore affect both the willingness and ability to save. One should expect higher discretionary saving among conscientious people, as found by Brandstätter (1996) and Wärneryd (1996b). Since conscientious persons would be expected to keep track of their finances, they are less likely to have to borrow (that is, engage in 'negative' saving). Support for such a relationship has been reported by Webley and Nyhus (2001), who found that people who have had mild or serious debt at least once were less conscientious than people who never have been debtors.

Brandstätter proposed that extraversion might be important for saving behaviour and found empirical support for this in his research. Extraversion is associated with lower saving which makes sense in light of the social comparison theory of saving (see e.g. Schor, 1998). This theory states that people will be influenced by the saving and consumption behaviour of people they meet regularly. One aspect of extraversion is liking to spend time with other people. Extraverts are therefore more likely to meet more people than introverts and might more often be exposed to consumption patterns that make them less inclined to save. More frequent interaction with other people often also causes extra expenditures. Going out, inviting people home, or visiting other homes often involves spending, which will in turn reduce saving. As introverts are expected to save more, it is also plausible to expect that they borrow less than extraverts who might borrow to pay for conspicuous consumption.

Emotional stability has been found to increase discretionary saving (Brandstätter, 1996). This is a plausible relationship as emotional stability also encompasses elements of self-control and planning. Emotionally stable people are therefore more likely to be able to follow their own plans and budgets than the emotionally unstable. For example, some people have been found to engage in impulsive and excessive buying (see e.g. Hoch and Loewenstein, 1991). It is likely that people found to have a tendency to give in to short term desires also are placed on the neurotic side of the emotional stability dimension. It is therefore also more likely that emotionally unstable people will incur consumer debt.

Intellect or autonomy has not been found to be a significant predictor in any of the studies reviewed, but it is plausible that this dimension might also affect saving. The ability to make long-term plans for saving and consumption requires, in most cases, a strong intellect. Higher intellect may also increase the probability that a consumer will choose the best investment and borrowing arrangements in the market, and thereby avoid usurious rates of interest on their loans and secure high returns on their investments. It is therefore plausible to expect higher intellect to be associated with higher discretionary saving and less debt. Autonomy, which is a competing label for this factor (Hendriks, Hofstee, De Raad and Angleitner, 1999), will probably work in the same way. Autonomous people are likely to favour saving and to avoid debt in order to maintain their independence.

Agreeableness has not been associated with saving in previous investigations, but it is possible that there is a relationship. Agreeableness involves thinking of, and being concerned about, other people. This might be reflected in a person's generosity in terms of gift-giving, *inter vivos* transfers, charity etc. Less agreeable people can be expected to keep their money for themselves and have higher discretionary saving than more agreeable people.

In the following, we will build on previous work on the relationship between saving and personality in order to test the expected relationships outlined above. We will investigate different saving forms separately. Few previous studies have broken saving into different types in order to investigate whether they are influenced by psychological factors in different ways. Furthermore, we will explicitly deal with the problem of level of analyses. Economic behaviour is often studied at the household level, since it is difficult to disentangle the saving or spending resulting from the acts of individual members in a multi-person household. Theories concerning the effects of personality are, on the other hand, at the individual level. Instead of using the average personality scores of spouses/couples or the score of just one household member when conducting the analyses, we will also analyse households with couples separately including the scores of heads of the households and spouses as distinct independent variables. Likewise, we will analyse

single-person households separately. Finally, we will establish how much personality factors contribute to explaining saving and borrowing beyond that explained by the socio-economic variables that have traditionally been used by economists. As it is plausible that personality might have an effect on the education level, income level, and family situation of a person, a step-wise analysis, where personality is entered last, will show the effect of personality when these other possible effects are controlled for. If we find significant effects of personality, this might also encourage economists to include personality dimensions in studies of economic behaviour, as has already been attempted by Hurd and Swallen (1997).

METHOD

The data

For the purpose of this study, we will make use of data collected for the CentER Saving Survey (CSS). This survey includes both detailed information on saving and borrowing behaviour in addition to items designed to tap many different psychological concepts.[2] The questionnaires are answered by all household members aged 16 or more.

Data are collected from a so-called telepanel. A telepanel is a panel of households (in this case about 2800) who communicate with the fieldwork company by means of modems and computers. Each household has a computer and a modem installed in their home. In return for this, household members agree to answer questions for 30 minutes every week. Questions are transmitted to the households on a weekly basis, and they are supposed to answer them during computer sessions within a few days. This special data collection technique makes it possible to use longer questionnaires than in other types of survey. Lengthy questionnaires are split into parts that will take the respondents 30 minutes to answer. The longer the questionnaire, the longer the time period used to collect the data. The burden on the respondents remains the same so in this way it is possible to combine complex variables such as saving and personality in the same study. The panel answers the CSS questionnaires in the period May–October each year. In this study we use data from the psychological part of the questionnaire from two waves of data collection (collected in 1996 and 1997). Psychological data from 1996 and 1997 were used, while data concerning income and assets collected were collected in 1997 and concerned income in 1996 and assets as of December 1996.[3]

Before analysing the impact of personality factors on saving and borrowing behaviour, some cleaning of the sample was necessary. Only heads of the households and their spouse/partner were included in the analyses. A household was excluded if data from one of the partners in a household were missing or one or both partners did not fill out all the necessary questionnaires in both waves (psychological data in 1996 and 1997 and income and assets data from 1997). The final sample consisted of 1266 persons in 734 households. 532 of the households consisted of couples while 202 households did not have a partner as member. 172 households consisted of only one person. There were children present in 307 of the households. The range of numbers of persons in the household was one to seven while the number of children varied from one to five. The mean age of the head of the

[2]See Nyhus (1996) for further information about the data collection methods and questionnaires (http://center.kub.nl/pub/vsbpr2.html).

[3]These data, the questionnaires, and further information can be downloaded from the web site of the CentER Savings Survey on request.

households and partner was 52 (range 26–92). 230 of the heads of the households had low education, 203 middle education, and 301 had high education. 619 of the heads of the households were males.

The unit of analyses

As noted above, economic behaviour is commonly studied with the household as the unit of analysis. This is partly because many economic decisions are made jointly and partly because it is difficult to disentangle which household members are responsible for different incomes and expenditures. In this study, we will focus on the heads of the households and any spouse/partner, as we believe these are the most influential household members with respect to deciding use of income and assets. In the following, we will refer to this unit as 'the household'. Other household members, such as parents-in-law and children above 16 years of age, have also been interviewed, but we believe that these are more likely to keep their finances separate from the head of the household and any spouse/partner.

Measures

Saving variables

Brandstätter (1995) argued that the predictive power of personality measures becomes better if broader categories of acts performed by a person are used as dependent variable as opposed to a specific act. A single act of contractual or discretionary saving may have a low correlation with personality dimensions while the association might be higher if more aggregate measures of saving are used. For the purpose of this paper, we use the value of savings and debt at a specific point in time as opposed to measuring saving over a limited period. This measure represents saving behaviour over an extended period, which we believe will increase the probability of finding any effects of personality on saving. The asset components used to construct the various saving measures are the results of deliberate acts of saving so that involuntary saving is avoided. The exception is liquid saving, which includes the balances of current accounts.

The CSS data set includes data about 30 different assets ranging from balances on current accounts to the value of property. For reasons explained previously, we will not just add them all up in order to construct one measure of saving. Rather we will combine the asset components we believe to be similar 'psychologically' in order to check whether the personality factors influence these forms of saving differently. The following measures of saving behaviour are used.

(1) Household liquid saving, which is the total balance on current and savings accounts, employer sponsored savings plans, and loans to family/friends. This is considered to be less risky saving and is also what most consumers perceive as saving.
(2) Investment saving, which is the total value of mutual funds, shares, bonds, and saving certificates. These types of saving involve more risk than liquid saving. The data set also include some information about ownership and values of options, but these variables were excluded due to an unacceptably high number of missing values (above 50%).
(3) Insurance saving, which is the total value invested in annuity insurance and endowment insurance. Values of pension insurance and life insurance were also measured, but due to the high number of missing values for these variables they were excluded from the analyses.

(4) The sum of debt. This is the sum of extended lines of credit, outstanding debts on hire-purchase contracts or mail-order firms, debts based on payment by instalment and/or equity-based loans, study loans, and credit card debts. These financial liabilities can be considered as negative savings.
(5) Total saving is defined as liquid saving + financial saving + insurance saving − debt. This measure deviates from a standard economic definition of a household's total saving by not including the value of property subtracted by the sum of mortgages. The reason for excluding mortgages and property is that the respondents' estimates of the values of the latter are relatively noisy. We also believe that the definition we use is sufficient in order to explore whether effects of personality regarding the four variables listed above also can be found in the aggregated savings measure or whether they might be cancelled out.
(6) Plans to save the next 12 months were also included in the analyses in order to replicate the findings reported by Wärneryd (1996b). The question used was 'Are you planning to put money aside in the next 12 months?' and the answer was given by choosing one of four alternatives: 'yes, certainly', 'yes, perhaps', 'probably not', and 'certainly not'. This was turned into a binary variable: plans to/does not plan to save.

Household net income

Household net income was measured by adding different sources of incomes (wages, income from letting out rooms, interest, subsidies etc) and wage-replacing transfers (for example retirement and disability pensions/benefits and unemployment benefits) and subtracting mortgage interest payment and calculated income tax.[4]

Education

All respondents are asked to indicate their highest level of education completed using 13 categories, from primary to university education. Responses were recoded into high, medium, and low education, according to the following procedure: kindergarten/primary education, continued primary education or elementary secondary education, continued special (low-level) education and secondary education, junior vocational training, special (low-level) education and vocational training through the apprentice system, and 'other sort of education/training' are coded as low education, pre-university education and senior vocational training are coded as middle education, while vocational colleges and university education are coded as high education.

Personality structure

The CSS includes two personality inventories: the 16PA (personality adjective) scale developed by Brandstätter and the FFPI (Five-Factor Personality Inventory) developed by Hendriks *et al.* (1999). Both scales are constructed so as to facilitate collection of personality data, in that they are shorter than most other personality indices, and each of them takes only a short while for respondents to complete. Both scales might therefore be useful for surveys as long as they are reliable and have construct validity.

Brandstätter (1988) designed a 16PA scale as a short measure of Cattell's personality dimensions. Respondents locate themselves on 16 personality dimensions, each represented by two bipolar scales to achieve a higher reliability of the measures and to allow for internal consistency checks. Brandstätter (1988) used data from 228 respondents (a mixture of students and married members of the general public) to demonstrate that four

[4]The exact procedures used when calculating net income are described in the documentation for the CentER savings survey published at http://center-ar.kub.nl/

of the five secondary factors (emotional stability, extraversion, conscientiousness or norm-orientation, independence, and tough-mindedness) of the 16PF could be satisfactorily predicted from the secondary factors of the 16PA (the one that could not was 'tough-mindedness'). He further reported four studies using only the 16PA, which show that the secondary factors relate to other variables in line with theoretical predictions, which provides some evidence that the 16PA is a valid instrument.

Only half of the 16PA was included in the CSS every year, which necessitates the merging of two waves in order to use the full scale. Respondents answered the questions by using a seven-point scale and the instructions given to the respondents were as follows: 'Now we would like to know how you would describe your personality. Below we have mentioned a number of personal qualities in pairs. The qualities are not always opposites. Please indicate for each pair of qualities which number would best describe your personality. If you think your personality is equally well characterized by the quality on the left as it is by the quality on the right, please choose number 4. If you really don't know, type 0 (zero)'. The items can be found in Table 1. Using data from multiple waves of the CSS the stability in the replies at the level of items was checked and found to be satisfactory. With the exception of one item, the rank correlation between answers given to the same question by the same person was between 0.5 and 0.7 with both one and three years' interval.

The FFPI consists of 100 brief and concrete statements and can, according to Hendriks *et al.* (1999), be used to assess the Big Five factors of personality (Digman, 1990). Each factor is represented by 20 items, half of which are positively phrased and half are

Table 1. Factor structure of the 16PA

Items	Emotional stability 1	Agreeableness (inflexibility) 2	Autonomy (tough-mindedness) 3	Extraversion (outgoing) 4	Conscientiousness (meticulous) 5
Oriented toward reality–dreamer	**0.468**	– 0.239	0.301	0.149	0.250
Critical–accommodating	0.107	0.276	0.312	**0.393**	0.368
Direct, straightforward–diplomatic	– 0.040	– 0.123	**0.607**	0.067	– 0.073
Independent–prefer company	0.220	0.114	0.040	**0.501**	0.122
Happy with myself–doubtful	**0.573**	– 0.078	0.323	– 0.162	– 0.133
Artificial–natural	– 0.091	0.170	– 0.039	**0.428**	0.032
Creature of habit–open to changes	– 0.213	– **0.553**	– 0.039	0.047	– 0.030
Self-controlled–moody	**0.557**	– 0.116	– 0.277	0.098	0.344
Need to be supported–independent	– **0.553**	– 0.166	– 0.152	– 0.155	– 0.091
Self-confident–timid	**0.602**	0.253	0.400	0.091	0.095
Little self-control–disciplined	– 0.479	0.060	0.233	– 0.019	– **0.481**
Can handle stress–cannot handle stress	**0.688**	0.216	0.067	0.086	– 0.111
Well balanced–quick-tempered	**0.699**	– 0.009	– 0.233	– 0.145	0.049

Continued overleaf

Table 1. *Continued*

Want new experiences–want quiet life	0.192	**0.704**	0.122	0.118	− 0.096
Oriented towards things–towards people	0.106	− 0.090	0.015	**0.604**	− 0.124
Nervous–relaxed	− **0.736**	− 0.049	0.133	0.055	0.174
Slow thinker–quick thinker	− **0.407**	− 0.290	− 0.307	− 0.047	− 0.254
Like to try things–conservative	0.078	**0.708**	0.122	0.044	− 0.189
Easily worried–not easily worried	− **0.660**	− 0.085	− 0.040	− 0.123	0.316
Trained thinker–untrained thinker	**0.372**	0.347	− 0.101	0.267	0.302
Flexible–stubborn	0.071	− 0.077	− 0.341	− **0.475**	0.086
Gentle–rough	0.045	0.029	− **0.466**	− 0.407	0.222
Quiet, calm–vivid, vivacious	0.171	− 0.320	− **0.647**	0.188	− 0.002
Easily worried–not easily worried	− 0.415	− 0.109	− 0.030	− 0.177	**0.572**
Carefree–meticulous	0.005	0.098	0.066	− 0.107	− **0.711**
Imaginative–down-to-earth	− 0.311	**0.616**	− 0.006	− 0.130	− 0.095
Shy–dominant	− 0.246	− 0.228	− **0.649**	− 0.077	− 0.055
Aimed at proving myself–indulgent	0.119	0.396	**0.473**	0.290	0.018
Not easily hurt–easily hurt, sensitive	0.265	− 0.107	0.200	0.377	− **0.463**
Friendly–cold	0.011	0.241	0.133	− **0.674**	0.244
Trusting, credulous–suspicious	− 0.006	0.025	− 0.110	− **0.491**	− 0.171
Principled–carefree	0.023	− 0.102	0.084	− 0.043	**0.644**
Variance explained after rotation	14.30	8.367	8.344	8.136	8.084
Cronbach's alphas	0.8313	0.6636	0.6263	0.6070	0.6106

Note: $N = 1900$. 47.23% of total variance explained. The Cronbach's alphas are based on items in bold.

negatively phrased. Great efforts were made to produce an instrument suitable for a broad range of educational levels. All items were comprehensible for respondents with low education. This was achieved by using elementary sentences without any conditionals, avoiding negatives and convoluted formulations and trait-descriptive adjectives and nouns. Starting out with a pool of 914 items, the authors used several techniques in order to select the items that would constitute the final index. The items were judged on comprehensibility, observability, and social desirability. An item was selected if it had its primary loading on the factor it should represent and a spread of secondary loadings, if it scored high on comprehensibility, and if the correlation between self-ratings and averaged other's ratings were satisfactory. The five factors were labelled Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Autonomy (instead of Intellect). The scale was tested in several ways. The factor structure was tested using multiple data sets. Criterion validity was tested by comparing factor scores taken from self-ratings with factor scores derived from averaged peer scores. Construct validity was tested by comparing the scale with three alternative Big Five measures. A test–retest procedure was carried out in order to assess the stability in the assessments. Based on the

results, Hendriks *et al.* conclude that the FFPI is a reliable, valid and efficient Big Five reference instrument.

The FFPI of Hendriks *et al.* was included in the CSS in 1996. The respondents were presented to a list of statements and they answered by using a five point scale (labelled 1, does *not* apply at all, 2, applies slightly, 3, does *not* apply very well, 4, largely applies, and 5, fully applies). The instructions given were as follows: 'below, 100 qualities will be shown on the screen. The qualities are formulated as brief descriptions of a person. Please indicate for each quality to what extent you think it applies to you. Do not think about your answer too long. When you are not sure about your answer, compare yourself to people that you know well. Some of the qualities may remind you of earlier parts of the questionnaire. However, please try to respond as if this were a new question'. We followed the recommendations provided by the designers of the FFPI when constructing factor scores representing the Big Five personality dimensions.

RESULTS

Table 1 shows the factor structures resulting from principal component analysis followed by a varimax rotation for the 16PA. This factor structure is similar to that reported by Wärneryd (1996b), using CSS data from 1993 and 1994. There were six factors with eigenvalues over unity. The eigenvalues for the first 12 factors were 5.38, 3.29, 2.49, 2.38, 1.58, 1.19, 0.99, 0.98, 0.91, 0.85, 0.77, 0.75. A scree test (Cattell, 1966) suggests that five factors are appropriate. Given that previous analyses of 16PA have identified five factors, and these factors are readily interpretable, this is encouraging. These factors also have reliabilities ranging from 0.61 to 0.83, which is reasonable. The FFPI factors, as would be expected, are extremely reliable: the Cronbach alphas are Extraversion, 0.90; Agreeableness, 0.83; Conscientiousness, 0.85; Emotional stability, 0.90; Autonomy, 0.86.

Table 2 displays the correlation coefficients between the 16PA factor scores and the FFPI factor scores. There is some overlap between the factors derived from the 16PA and the FFPI, but this overlap is only partial. Only the correlation between the emotional stability factor of the 16PA and FFPI was so high (0.66) that we constructed an aggregate measure of emotional stability in the analyses. The lower correlation between the other factors suggests that the factor scores derived from the two instruments assess different aspects of the latent factor, and we therefore decided to include them all in the subsequent analyses. In order to avoid confusion, we gave the 16PA factor scores new names (see Tables 1 and 2). The names were adopted from previous studies using the 16PA.
The nine personality factors used are the following.

Table 2. Correlation coefficients between factor scores derived from the 16PA and the FFPI

FFPI	Emotional stability	Extraversion (outgoing)	Conscienttiousness (meticulous)	Agreeableness (inflexibility)	Autonomy (tough-mindedness)
Emotional stability	**0.66**	**0.08**	**0.30**	0.01	0.05
Extraversion	0.03	**0.44**	0.00	**0.20**	**0.41**
Conscientiousness	**0.12**	0.04	**0.45**	**0.27**	0.04
Agreeableness	0.04	**0.41**	**0.17**	**0.12**	**0.36**
Autonomy	**0.41**	**0.21**	**0.20**	**0.31**	**0.25**

Note: $N = 1796$. Correlation coefficients in bold are significant at the 1% level (two tailed).

(1) Emotional stability (16PA/FFPI), which encompasses dimensions such as nervous–relaxed and need for support–independent.
(2) Inflexibility (16PA), which encompasses openness to changes and conservatism.
(3) Tough-mindedness (16PA), which covers whether a person is direct or diplomatic, shy or dominant when dealing with other people.
(4) Meticulous and principled (16PA) includes a person's self-discipline and the tendency to get hurt and easily worry about things.
(5) Outgoing (16PA) describes preference for company of other people and whether or not a person is cold and suspicious towards other people.
(6) Agreeableness (FFPI) includes the willingness to help other people and to act in accordance with other people's interests.
(7) Autonomy (FFPI) covers to what extent a person makes his or her own decisions, initiative, and control.
(8) Conscientiousness (FFPI) includes a person's preference for following rules and schedules and keeping engagements.
(9) Extraversion (FFPI) encompasses preference for other people's company (as outgoing does), but it also includes the tendency to like attention and to try to inspire other people.

Tables 3–6 report some of the results from multiple regression analyses carried out in order to establish the impact of these nine personality factors on the six dependent variables described above. We have used the following procedures. The dependent variables were analysed by use of a hierarchical form of regression. The varibles were entered into the analysis in the following order: (1) income and demographic factors and (2) personality factors. The rationale behing this procedure is to show whether personality factors explain variance in saving behaviour over and above that explained by economic and demographic variables. In the tables, the changes in adjusted R^2 and the significance of the F-changes for the block of socio-economic variables and the block of personality factors respectively are presented. We used three different samples: (1) all households, using data based on the head of the household, (2) households with a partner present, using data based on both the head of the household and the spouse, and (3) households without a partner.

Table 3 shows the results for household liquid saving. Liquid saving is larger in households where the head has high education and in households with higher income. Liquid saving decreases with the size of the family, while the presence of a partner is associated with higher saving. Some of the personality factors are also significant. In all three kinds of household, having an emotionally stable head is significantly associated with higher household liquid savings. In households consisting of couples, more inflexibility on behalf of the head of the household is associated with higher saving while higher autonomy and extraversion is associated with less saving. More agreeableness on behalf of the partner is negatively related to liquid saving. In households without a partner, tough-mindedness is positively related to liquid saving, while the relationship is opposite with regards to agreeableness. In the analyses of all households and of households consisting of couples, the personality factors significantly increased explained variance in liquid saving. The personality factors did not increase explained variance in liquid saving significantly in single households.

Variation in risky saving was analysed in a similar manner, using the 240 households holding this type of assets. For all three samples, inclusion of the personality factors resulted in a drop in adjusted R^2. None of the personality factors had a significant

Table 3. OLS regression: log of liquid saving

	All households		Couples only		Households without a partner	
	B	(sig)	B	(sig)	B	(sig)
Constant		0.000		0.000		0.009
Age—head	0.093	0.719	− 0.238	0.716	0.288	0.580
Age^2/100—head	− 0.014	0.957	0.087	0.889	− 0.230	0.654
High educat. head	**0.179**	0.000	**0.143**	0.011	**0.177**	0.046
Middle educat. head	**0.094**	0.022	0.066	0.191	0.100	0.224
Age—partner			0.366	0.550		
Age^2/100—partner			− 0.111	0.848		
High educat. partner			0.037	0.475		
Middle educat. partn.			0.052	0.259		
Household net income	**0.172**	0.000	**0.192**	0.000	0.066	0.390
Family size	− **0.107**	0.029	− 0.073	0.163	− **0.142**	0.044
Partner present in HH	**0.172**	0.001				
Head of HH male	0.025	0.541	0.009	0.845	0.005	0.948
Emotional stab: head	**0.111**	0.005	**0.125**	0.007	**0.133**	0.100
Inflexibility: head	0.002	0.967	**0.096**	0.049	− 0.026	0.751
Tough-minded: head	**0.087**	0.039	− 0.030	0.566	**0.149**	0.089
Meticulous: head	0.027	0.510	0.030	0.546	0.115	0.195
Outgoing: head	− 0.002	0.967	0.027	0.593	− 0.001	0.988
Agreeableness: head	− **0.160**	0.000	− 0.081	0.114	− **0.196**	0.035
Autonomy: head	− 0.048	0.273	− **0.095**	0.076	− 0.075	0.399
Conscient: head	0.020	0.612	0.043	0.370	− 0.022	0.791
Extraversion: head	− **0.079**	0.079	− **0.148**	0.006	− 0.047	0.614
Emotional stab: partner			0.047	0.296		
Inflexibility: partner			− 0.063	0.196		
Meticulous: partner			0.078	0.103		
Tough-minded: partner			− 0.054	0.245		
Outgoing: partner			− 0.016	0.745		
Agreeableness: partner			− **0.092**	0.053		
Autonomy: partner			0.031	0.526		
Conscient: partner			0.012	0.792		
Extraversion: partner			− 0.001	0.979		
N	734		532		202	
Adjusted R^2 only socioec. variables	11.2	0.000	11.3	0.000	7.2	0.003
Adjusted R^2 socio-ec. and personality variables	14.3	0.000	13.6	0.025	8.7	0.202

Note: This table reports OLS regressions of the log of liquid saving on the set of variables listed in the first column. Coefficients significant at the 10% level are in bold.

relationship with risky saving. In order to investigate the role of personality for risky saving further, we explored the extent to which personality factors could predict which households would engage in risky saving in the first place. We did this by constructing a dummy variable (holder/not holder of risky assets) and analysing this by means of logistic regression using all households in the sample. The results are displayed in the third column of Table 6. The results show that investments in risky assets are more likely in small households where the head has high education and the income is high. Three personality factors significantly contribute towards improving the predictions: investments in risky

Table 4. OLS regression: log of debt

	All households		Couples only		Households without a partner	
	B	(sig)	B	(sig)	B	(sig)
Constant		0.000		0.000		0.054
Age—head	0.372	0.245	0.301	0.694	0.694	0.333
Age^2/100—head	− 0.497	0.124	− 0.601	0.412	− 0.737	0.303
High educat. head	**0.209**	0.000	**0.192**	0.005	**0.300**	0.026
Middle educat. head	**0.131**	0.010	0.093	0.125	**0.297**	0.020
Age—partner			0.252	0.736		
Age^2/100—partner			− 0.149	0.835		
High educat. partner			− 0.026	0.670		
Middle educat. partner			0.011	0.841		
Household net income	**0.202**	0.000	**0.222**	0.000	**0.185**	0.083
Family size	0.076	0.184	0.005	0.930	0.127	0.208
Partner present in HH	0.080	0.168				
Head of HH male	− 0.012	0.802	− 0.022	0.665	0.002	0.984
Emotional stab: head	0.067	0.150	0.065	0.231	0.095	0.391
Inflexibility: head	**0.099**	0.039	**0.125**	0.027	0.135	0.260
Tough-minded: head	− 0.009	0.857	0.001	0.987	− 0.131	0.334
Meticulous: head	0.010	0.838	− 0.047	0.431	0.029	0.819
Outgoing: head	0.060	0.262	0.009	0.875	− 0.011	0.934
Agreeableness: head	− 0.043	0.401	0.051	0.388	− 0.113	0.445
Autonomy: head	− **0.129**	0.015	− **0.107**	0.087	− **0.251**	0.051
Conscient: head	0.011	0.822	0.064	0.253	− 0.120	0.292
Extraversion: head	− **0.156**	0.004	− 0.091	0.146	− **0.362**	0.008
Emotional stab: partner			0.014	0.789		
Inflexibility: partner			0.034	0.518		
Meticulous: partner			0.021	0.698		
Tough-minded: partner			0.054	0.315		
Outgoing: partner			0.078	0.181		
Agreeableness: partner			− 0.040	0.466		
Autonomy: partner			− 0.062	0.281		
Conscient: partner			0.008	0.878		
Extraversion: partner			− 0.043	0.470		
N	500		406		94	
Adjusted R^2 only socio-ec. variables	15.2	0.000	12.9	0.000	14.0	0.005
Adjusted R^2 socio-ec. and personality variables	16.5	0.062	12.2	0.659	20.3	0.091

Note: This table reports OLS regressions of the log of debt on the set of variables listed in the first column. Coefficients significant at the 10% level are in bold.

assets (investment saving) are more likely with more introvert, more inflexible and less autonomous heads.

Variation in insurance saving was also associated with personality structure to a slight extent. When analysing the 163 households holding this type of asset, the adjusted R^2 dropped when the personality factors were included in the analyses. When analysing all households together, emotional stability was positively associated, whilst conscientiousness was negatively related, with insurance saving. However, the factors did not contribute significantly towards increasing explained variance in insurance saving. We proceeded by exploring to what extent the personality factors could predict which households that would

Table 5. OLS regression: total saving

	All households		Couples only		Households without a partner	
	B	(sig)	B	(sig)	B	(sig)
Constant		0.671		0.391		0.888
Age—head	− 0.333	0.186	0.127	0.838	0.081	0.877
Age^2/100—head	**0.580**	0.021	0.124	0.834	0.145	0.777
High educat. head	0.063	0.129	0.035	0.514	0.112	0.206
Middle educat. head	0.043	0.278	0.050	0.294	− 0.021	0.793
Age—partner			− 0.861	0.138		
Age^2/100—partner			0.894	0.104		
High educat. partner			− 0.007	0.882		
Middle educat. partner			0.042	0.341		
Household net income	**0.324**	0.000	**0.394**	0.000	0.107	0.169
Family size	0.010	0.835	0.059	0.237	− 0.050	0.472
Partner present in HH	− 0.005	0.914				
Head of HH male	− 0.059	0.139	− 0.038	0.380	− 0.071	0.351
Emotional stab: head	**0.110**	0.004	0.060	0.171	**0.144**	0.074
Inflexibility: head	0.061	0.112	0.051	0.271	0.068	0.418
Tough-minded: head	− 0.020	0.621	0.003	0.959	− 0.068	0.439
Meticulous: head	0.040	0.315	− 0.001	0.975	0.080	0.365
Outgoing: head	− **0.169**	0.000	− **0.118**	0.014	− 0.139	0.147
Agreeableness: head	0.049	0.230	0.072	0.139	− 0.027	0.773
Autonomy: head	− **0.150**	0.000	− 0.083	0.103	− **0.164**	0.066
Conscient: head	− 0.010	0.790	− 0.002	0.960	− 0.050	0.540
Extraversion: head	− 0.038	0.379	− 0.013	0.805	− 0.080	0.390
Emotional stab: partner			**0.085**	0.048		
Inflexibility: partner			0.027	0.527		
Meticulous: partner			0.012	0.787		
Tough-minded: partner			0.040	0.367		
Outgoing: partner			− **0.088**	0.062		
Agreeableness: partner			0.009	0.836		
Autonomy: partner			− **0.086**	0.065		
Conscient: partner			0.008	0.861		
Extraversion: partner			− 0.036	0.455		
N	734		532		202	
Adjusted R^2 only socio-ec. variables	16.7	0.000	20.9	0.000	8.9	0.001
Adjusted R^2 socio-ec. and personality variables	19.6	0.000	22.2	0.088	8.9	0.433

Note: This table reports OLS regressions of total saving on the set of variables listed in the first column. Coefficients significant at the 10% level are in bold.

save through an insurance policy. The results are displayed in column 4 in Table 6. Higher age, greater income, and the presence of a partner are associated with a higher tendency to buy insurance. Larger families are less likely to save through insurance policies. Three personality factors had a significant contribution towards improving prediction of purchase of insurance: purchases of insurance are more likely if the head is introvert and scores low on the agreeable and autonomy factors.

Our next concern was the effect of personality factors on household debt. First we analysed whether the factors could contribute towards increasing explained variance in debt among the 500 households holding debt. The results can be found in Table 4. Higher

Table 6. Logistic regressions: heads of the household plan or do not plan to save next 12 months, household engaged or not engaged in investment saving, household engaged or not engaged in insurance saving, household has or has not debt

	Head of household plans to save		Tendency to engage in different forms of saving					
			Engaged/not engaged in investment saving		Engaged/not engaged in insurance saving		Have/don't have debt	
	B	(sig)	B	(sig)	B	(sig)	B	(sig)
Constant	2.562	0.133	**−3.960**	0.006	**−7.657**	0.000	**−4.745**	0.003
Age—head	0.029	0.633	0.043	0.394	**0.293**	0.000	**0.192**	0.002
$Age^2/100$—head	−0.001	0.991	−0.011	0.811	**−0.325**	0.000	**−0.214**	0.001
High educat. head	−0.213	0.415	**0.629**	0.005	−0.074	0.763	0.274	0.198
Middle educat. head	−0.188	0.478	**0.645**	0.008	−0.049	0.851	**−0.413**	0.074
HH net income/1000	**0.010**	0.018	**0.015**	0.000	**0.011**	0.000	0.001	0.587
Family size	−0.141	0.184	**−0.263**	0.005	**−0.292**	0.003	0.100	0.235
Partner present in HH	**0.582**	0.082	0.446	0.125	**0.922**	0.008	0.135	0.647
Head of HH male	−0.025	0.937	0.134	0.632	−0.376	0.298	−0.374	0.214
Emotional stab: head	**0.334**	0.045	0.200	0.176	0.151	0.378	**−0.315**	0.029
Inflexibility: head	−0.112	0.429	**0.316**	0.013	0.123	0.374	−0.062	0.598
Tough-minded: head	0.243	0.104	−0.124	0.356	−0.109	0.469	−0.181	0.164
Meticulous: head	0.127	0.371	0.030	0.814	0.123	0.384	**−0.293**	0.016
Outgoing: head	−0.074	0.657	−0.107	0.459	0.127	0.430	−0.006	0.965
Agreeableness: head	−0.061	0.670	−0.178	0.165	**−0.315**	0.031	**0.270**	0.030
Autonomy: head	−0.013	0.935	**−0.392**	0.008	**−0.328**	0.044	**0.316**	0.025
Conscient: head	0.134	0.322	−0.025	0.839	0.132	0.371	−0.160	0.196
Extraversion: head	0.015	0.920	**−0.486**	0.000	**−0.415**	0.007	−0.016	0.902
Nagelkerke R^2 (socio-ec. variables)	7.4	0.000	18.0	0.000	17.1	0.000	11.5	0.000
Nagelkerke R^2 (socio-ec. and personality variables)	9.9	0.279	23.0	0.000	20.2	0.051	15.6	0.004

Note: This table reports the results of logistic regressions of plans to save and whether or not a household engage in investment saving and insurance saving on the set of variables listed in the first column.

debt is associated with higher education and higher incomes. The relationship with education is probably due to educated people having student loans. Households with higher incomes are also likely to be granted higher loans than low-income families. Debt was also associated with some of the personality factors. Inflexibility, introversion, and less autonomy were associated with having more debt. These results were puzzling, since the direction of these relationships was the same as between these personality factors and saving. We therefore also investigated whether the personality factors could predict which households would have debt in the first place. The results are presented in the last column of Table 6. The likelihood of a household having debt increases with age. It is also higher among the emotionally unstable, less meticulous, more agreeable, and more autonomous heads. These results with respect to the signs of the relationship between personality factors and debt are more in line with what we expected.

Table 5 shows the results when analysing total saving (liquid saving + investment saving + insurance saving − debt). As expected, total saving is associated with higher incomes. The effect of education found in the previous analyses seems to have been cancelled out. This might be due to the fact that education was positively associated with both saving and the amount of debt among those having debt. The results regarding the

personality factors correspond to some extent to what we would expect in light of the results reported in Tables 3, 4, and 6. Emotional stability and low autonomy is associated with higher total saving, which should be expected given the robustness of these factors throughout the previous analyses. A surprising result, though, is that the outgoing factor is significant when analysing total saving, although this factor was not significant in any of the previous analyses. Likewise, extraversion and agreeableness found significant in the previous analyses are not significant predictors of total saving. A possible explanation for this can be found in Table 2. The outgoing factor correlates quite highly with both extraversion (0.44) and agreeableness (0.41), and might therefore be considered as an intermediate factor in the space defined by agreeableness and extraversion. As both agreeableness and extraversion are negatively related to saving, the negative effect of the outgoing factor is consistent with the findings in the previous analyses. The effect of inflexibility found in the prior analyses is not significant when analysing total saving although the signs of the beta coefficients are as expected.

Another interesting result is the findings regarding couples. The findings suggest that the personality of the partner is more important for total saving than the personality of the head of the household. The emotional stability and autonomy of the partner is important for saving, while both partners' degrees of 'outgoingness' have independent effects on total saving.

Finally, we investigated whether the personality factors could predict intentions to save. The results are presented in the second column of Table 6. Households consisting of couples and households with higher incomes are more likely to have plans to save the next year. Emotional stability was the only personality factor that was significant. Emotionally stable people are more likely to have saving plans. This factor did not, however, significantly improve predictions of which households would be likely to have saving plans.

DISCUSSION

The results from this study suggest that there is a strong relationship between personality structure and economic behaviour. In particular, emotional stability, extraversion, and autonomy are robust predictors of saving and borrowing behaviour. Emotional stability and introversion increase saving and reduce borrowing. These findings are in line with previous research by Brandstätter (1995, 1996) and Wärneryd (1996b) and our *a priori* expectations. Autonomy is associated with lower saving and increases the likelihood of a household having debt. This is not in line with our expectations as we hypothesized that autonomous people would prefer to have saving instead of being dependent on others through loans. One possible explanation for this might be that some of the items used to measure this factor include risk taking (+) and the willingness to do as one is told (−). Saving is usually encouraged in the Netherlands and people who are less autonomous might therefore save and borrow less. People who avoid risk might also prefer to have a buffer against unforeseen events, and people who do not like taking risk might therefore have higher saving. This explanation cannot, however, explain why autonomy was negatively related to risky saving.

Agreeableness was also related to different forms of saving. As expected, more agreeable persons had less saving and were more likely to borrow money. Tough-mindedness was related to liquid saving in the expected direction. People who are focused on proving themselves, who are more stubborn etc have more savings. This is in line with

the notion that saving is associated with self-control. It is also interesting that it is in households without a partner that this factor has an effect. These households often have a more difficult economic situation than households including a partner. Willingness to save is therefore important when the *ability* to save is lower.

We did not find the expected relationship with regards to conscientiousness. Schmölders (1966), Brandstätter (1996), and Wärneryd (1996b) all provide evidence that supports the plausible idea that conscientiousness is important for saving. In this research the latter plays no part in predicting saving of any kind, except for the meticulous factor that was negatively associated with the tendency to borrow and with amounts saved through insurance. This is a puzzle, particularly in view of the fact that both Brandstätter's and Wärneryd's results were based on earlier waves of the CSS panel. One possible explanation for this is that there has been differential panel attrition (see Webley and Nyhus, 2001) and those staying in the panel are more conscientious than those who have left it. Note that to be included in the analysis households had to be in the panel for two years (1996 and 1997). This would reduce the variation in conscientiousness and might therefore attenuate its impact.

Although the increases are not large, personality factors do contribute significantly towards increasing explained variance in saving and debt. This should encourage economists to include personality structure in their surveys as economists in recent years have taken interest in explaining individual differences in saving (e.g. Venti and Wise, 2000). Most personality inventories are usually too long to be considered for surveys, as the response rate tends to decrease with the length of the questionnaires (Oppenheim, 1992). We have, however, demonstrated that the two scales 16PA and FFPI are sufficiently good instruments to capture relevant differences in personality structure, and they are so short that they are suitable for use in surveys.

The results also suggest that it is important to collect data from both heads of the households and the partners. In some cases the personality of the partner is more important than that of the head of the households; in other cases it seems as if both partners' scores on a personality factor (e.g. outgoing) have independent effects on household saving. If only data from the heads of the households are used, this might lead to erroneous rejections of hypotheses regarding personality factors and saving.

Unlike most previous research, we used a number of measures of saving behaviour. The results suggest that this is fruitful when investigating effects of psychological variables on saving. Some personality factors only affect certain types of saving, and these relationships will not necessarily show when analysing total saving only. As some personality factors might both increase saving and increase the amount of debt, the effect on total saving might cancel out. Having completed the current study, our feeling is that the most appropriate place to look for links between saving and personality is to differentiate between saving types that are governed by different psychological mechanisms (e.g. attitudes towards risk, willingness to delay gratification). We also expect that an interesting sample to study is households nearing retirement. Here one might expect an evening out of the variations in circumstances and to see the end result of a whole series of savings decisions coming to fruition.

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