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## The role of personality traits in household loan expectations and borrowing constraints

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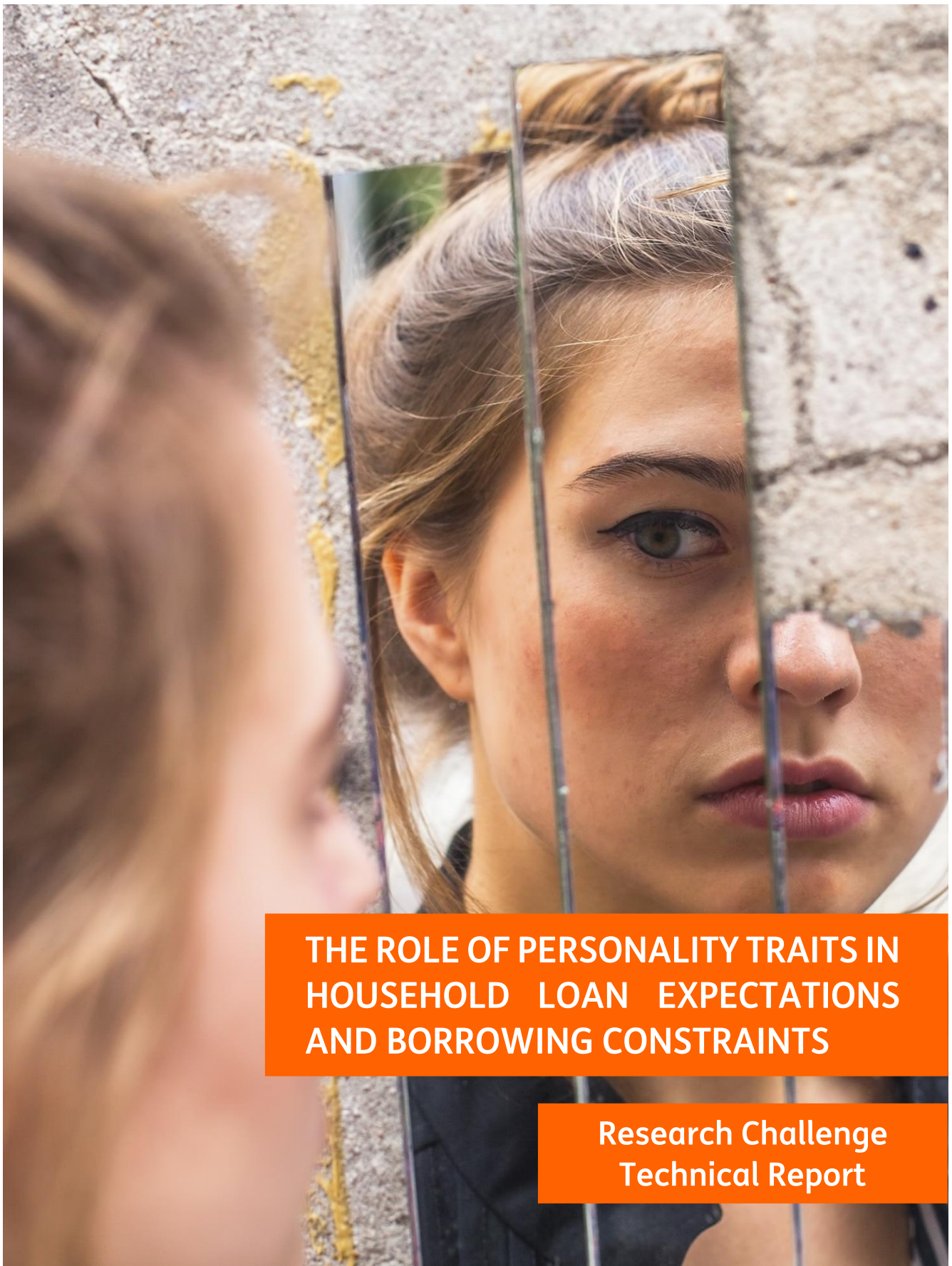
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Olga Goldfayn | Nathanael Vellekoop

# The Role of Personality Traits in Household Loan Expectations and Borrowing Constraints

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Sustainable Architecture for Finance in Europe



**THE ROLE OF PERSONALITY TRAITS IN  
HOUSEHOLD LOAN EXPECTATIONS  
AND BORROWING CONSTRAINTS**

**Research Challenge  
Technical Report**

**Olga Goldfayn  
Nathanael Vellekoop**

**THINK FORWARD  
INITIATIVE**

# THE ROLE OF PERSONALITY TRAITS IN HOUSEHOLD LOAN EXPECTATIONS AND BORROWING CONSTRAINTS \*

## TECHNICAL REPORT

Olga Goldfayn and Nathanael Vellekoop †  
March 2018

### Abstract

We explore how personality traits are related to household borrowing behavior. Using survey data representative for the Netherlands, we consider the Big Five personality traits (openness, conscientiousness, agreeableness, extraversion and neuroticism), as well as the belief that one is master of one's fate (*locus of control*). We hypothesize that personality traits can complement as well as substitute financial knowledge of a household. We present three sets of results. First, we find that personality traits are positively correlated with borrowing expectations. Locus of control, extraversion and agreeableness are correlated with informal borrowing expectations, which is the expectation that one can borrow from family and friends. With respect to expectations on the approval of a formal loan application, it is locus of control and conscientiousness that are positively associated. Effect sizes are large and economically meaningful. Second, we find that personality traits are important for borrowing constraints. A more internal locus of control and higher neuroticism are correlated with being denied for credit, as well as discouraged borrowing. Our third set of results reports findings on personality traits and loan regret, and how traits are correlated with dealing with loan troubles. Many households in our sample express regret (21%), but more open, more agreeable and more neurotic individuals are more likely to express regret. Our results are not driven by financial knowledge, time preferences or risk attitudes. Overall these findings imply that non-cognitive traits are important for borrowing behavior of households.

**Keywords:** borrowing constraints, personality traits, household finance.

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# 1. Introduction

The ability of households to borrow money is an essential feature of capitalist economies. Households can borrow in order to invest in durable assets, like housing, education, or cars. Other motives for households to borrow could be to smooth consumption (Deaton, 1991). Households desire to smooth consumption from periods with high income in the future to temporary low income in the present. Households that are borrowing constrained miss out on some or all of these benefits of borrowing. For example, households that are borrowing constrained could be consuming their entire income in period, because they miss out on the smoothing benefits of borrowing money.

In a seminal paper, Jappelli (1990) finds that a sizable share of households with a higher wealth-to-income ratio are borrowing constrained. He uses a question in the Survey of Consumer Finances that asks whether a credit application has been denied. A second question asks whether a household thought of applying for a loan, but changed their mind, because they believed that their application would be rejected. Both questions are direct measures of borrowing constraints of households, and Jappelli (1990) shows that these measures outperform comparisons of high versus low wealth households. We use similar questions in a nationally representative household survey to measure borrowing constraints.

There are many reasons why households could be borrowing constrained. Banks can be unwilling to loan money if they deem the household not creditworthy, or if they cannot monitor perfectly repayment behavior. On the loan demand side, households may not apply for a loan – even if they would qualify for a loan – if they lack the financial literacy or financial capacity to start the loan process. In this paper we take a step further and view the loan application process as a process that requires certain non-cognitive traits. The distinction between cognitive (e.g. IQ) and non-cognitive capacities (e.g. personality traits) is made in the literature on educational attainment (Almlund et al., 2011). The idea is that personality traits and cognitive capacities can be complements as well as substitutes in the production of human capital. An example of substitutes in the case of education is that a lower IQ can be compensated with certain personality traits to attain the same level of education.

In this paper we take a similar view that personality traits and financial knowledge are both inputs in the production process of a loan application. In the most general set-up, personality traits can be both complements and substitutes to financial knowledge. For example, a very introverted person may know that applying for a mortgage is the optimal thing to do, but shies away from the application process itself. Or individuals with external locus of control are less

likely to believe that their loan application will succeed, which means that they are less likely to apply for a loan, and more likely to change their mind on an application. In a similar vein one can imagine that personality traits like openness and agreeableness can be instrumental in bargaining with a loan officer, or giving in to a persuasive sales pitch. In the context of wages, Mueller and Plug (2006) and Heineck (2011) find that lower agreeableness and lower neuroticism are related to higher earnings for men, which is likely channeled through better bargaining abilities. When we add personality traits to the “production function” of loan applications, we hypothesize three possible outcomes.

First, personality traits may affect borrowing constraints directly, in the sense that certain personality traits hinder the loan application process. Second, we hypothesize that personality traits may affect the quality of the loan. Third, there are elements surrounding the loan process that have a relationship aspect. This could be bargaining with a loan officer, renegotiating after repayment problems arise, or even preferences for the ways of communication with a bank, e.g. internet banking to avoid personal contact.

We use several years of a large, longitudinal household survey for the Netherlands, with detailed questions on loan expectations, loan applications, and loan outcomes. The sample is representative for the Dutch population. Moreover, the survey implements questions on locus of control and the Big Five inventory of personality traits, as well as many background characteristics. We divide the process of loan application in three steps: expectations about the

outcome, the actual application, and what happens after the application has been granted—loan regret and loan problems. We find that personality traits matter in each step, especially locus of control. Individuals with an internal locus of control are more likely to report that they expect to be able to borrow money from family and friends, as well as from formal lending institutions. Interestingly we find that higher openness, extraversion and agreeableness increase the expectations to borrow informally (from family or friends), but not from formal lending institutions. On the other hand, higher conscientiousness and lower neuroticism are positively associated with the expectation to borrow from formal lending institutions.

When we turn to the question whether a household has applied for a loan in the past two years, we find that only agreeableness matters. However, when we assess borrowing constraints, we find that both locus of control and neuroticism are important. We assess borrowing constraints by the two measures Jappelli (1990) proposed. The first assesses whether a household is denied credit. The second question asks whether an individual planned to apply for a loan in the past two years, but changed her mind. We find that on both measures a more external locus of control and higher neuroticism are associated with being credit constrained.

The magnitudes are economically meaningful. A one standard deviation increase in external locus of control is associated with a 0.8 percentage point increase in the probability that a request for credit is turned down. This is a large effect, given that the baseline probability of being turned

down is 3.6 percent. For changing one's mind on a loan application external locus of control is associated with a 0.3 percentage point increase, where the unconditional probability is 1.2 percent.

The survey also contains questions on events that happen after a loan has been granted. For mortgages there is the question whether individuals consult with their bank when they foresee problems with loan repayment. Another question asks whether individuals have ever been in a trajectory of formal debt restructuring. Although both cases are low probability events in a given cross-section, we find in both cases that extraversion matters (and agreeableness for formal debt restructuring).

As far as we know, we are the first ones to document the relationship between borrowing expectations and borrowing constraints on the one hand, and personality traits on the other. In the same vein that non-cognitive traits complement or substitute schooling, in the setting of household financial behavior they can complement or substitute financial literacy and financial capabilities. A straightforward extension, but beyond the scope of this paper, would be to investigate the relationship between personality traits and financial advice (Hackethal et al., 2012).

The remainder of this report is structured as follows. The next section reviews the relevant literature, where section 3 discusses the dataset and the empirical methodology. Section 4 shows how personality traits are related to formal and informal borrowing expectations, borrowing

constraints, and ex post borrowing behavior. Section 5 presents some extensions of the main results, and section 6 concludes.

## 2. Literature

Our research connects two strands of literature. The first focuses on borrowing decisions of household in general and borrowing constraints in particular, and the role of economic parameters and preferences in explaining household's credit choices. The second literature emphasizes the role of personality traits in economic outcomes.

### 2.1 How to Measure Borrowing Constraints

Economic preferences and attitudes – risk aversion and time preferences – have been identified as important aspects of household's borrowing behavior. Brown et al (2013) show that risk averse households are less likely to accumulate debt. Also, preferences for more consumption in the present stimulates the use of credit (Norum, 2008) and more expensive credit.

Jappelli (1990) is one of the first papers to use direct survey question on borrowing constraints, instead of proxies using top and bottom quintiles of the wealth distribution. He finds that about 20% of US households are liquidity constrained and documents that liquidity constraints are more important for younger households with lower levels of wealth (similar findings are reported by Zeldes, 1989). Moreover, he finds that there are households in the top of the wealth-to-income distribution who have been denied credit.

More recently, Teppa et al. (2013) calculate that about 8% of households in the European Union are borrowing constrained. Using alternative

measures of borrowing constraints, Teppa et al. (2013) arrive at the figure of 24% and even up to 40% (for people whose liquid assets are less than 6 month consumption needs). Also among European households, wealth and income effects have the major impact on having credit application being rejected, or being discouraged from applying for a loan.

In two papers, Jappelli (1990, 1998) shows that accounting both for rejected applicants and discouraged borrowers in the data produces more accurate measure of borrowing constraints than methods based on consumption data. This highlights an important consideration that not only being actually credit constrained, but merely perceiving oneself as such may result in significant economic costs for the household.

Levinger et al. (2011) find that inaccurate perception of own creditworthiness leads to a number of mistaken borrowing decisions. Examples are: not applying for a cheaper source of credit, and overusing credit cards. These results suggests, that financial literacy may be an important mechanism in explaining borrowing constraints, especially for perceived borrowing constraints. Indeed, Disney et al. (2013) show that low financial literacy is closely associated with higher costs and overuse of more expensive sources of credit.



## 2.2 Personality Traits in Finance and Economics

We contribute to research on borrowing constraints by connected it with another broad and fast growing research field, which considers the effect that an individual's psychological characteristics have on financial decisions of households. In this literature, personality is viewed as a system of attitudes and characteristics, which complement the other acquired or innate abilities, such as cognitive abilities, as well as education and skills. We focus on the characteristics, which can be measures by the Big Five personality traits, as well as Locus of Control.

To start with the latter, locus of control describes the personal beliefs about how much power one has over the outcomes in the life. People with internal locus of control feel that own actions, abilities and efforts determine their life, whereas people with an external locus of control find that external forces control their life. These external forces can be luck, fate, or intervention of other people. Locus of control has been shown to be a significant predictor for several economic outcomes, importantly, savings (Cobb-Clark et al.,

2013) and investments in risky assets (Salamanca et al, 2016). Perry (2005) has found that internal locus of control explains heterogeneity in the propensity to save, even after controlling for financial literacy.

Whereas locus of control offers insight into an individual's motivation, the Big Five personality traits give an idea of the patterns in which people feel, think and behave. These patterns can in turn affect a person's preferences and subsequent decisions. While there are several typologies, one of the most accepted is the NEO-PI-R scale, which includes and describes following traits (as presented in the Figure 1).

Agreeableness stands for harmony-seeking behavior; Conscientiousness – for dutifulness and discipline; Extraversion – or communicability; Neuroticism – or emotional stability; and Open-mindedness. Each of these domains encompasses an array of related specific characteristics of personality, or so-called facets. For instance, agreeableness includes such factors as trust or altruism as well as compliance, while conscientiousness comprises another group of factors such as dutifulness, self-control and order.

**Figure 1. Big Five personality traits, NEO-PI-R scale**

Trait	Positive characteristic	As opposed to	Related behavior
Conscientiousness	Organized, responsible, self-disciplined, dutiful.	Reckless, impulsive, unorganized.	Persistence, attention to details, self-discipline.
Extraversion	Sociable, active, outgoing.	Introvert.	Sensation-seeking, reward-seeking, conspicuous.
Agreeableness	Trusting, caring, conflict-avoiding.	Aggressive, egoistic, dominant.	Conformism vs. dominance, altruism.
Neuroticism	Calm, emotionally stable.	Anxious, nervous, insecure.	Anxiety, impulsiveness.
Openness to experience	Curious, creative, imaginative	Tough-minded, inflexible, grounded.	Trying new things, ideas vs. resistance to change.

It has been shown that extraversion and openness-to-experience have a significant and economically meaningful effects on saving, household asset allocation, as well as on debt level (Brown and Taylor, 2014; Nyhus and Webley, 2001). Conscientiousness is associated with wealth accumulation, such as retirement preparedness (Hurd et al., 2012, Duckworth and Weir, 2010). Additionally Parise and Peijnenburg (2017) find that people with low scores on conscientiousness and emotional stability tend to make sub-optimal financial choices and are more likely to experience financial distress. This is supported by the research on consumer's impulsive spending and conspicuous consumption being correlated with high extraversion and low emotional stability (Gladstone and Landis, 2017).

Though little research has been done so far in this field, there is a strong scientific background that invites considering borrowing behavior in general and credit constraints – actual and perceived – and it is possible to link this with personality traits and locus of control. Pereira et al. (2016) find that social capital – participation in social network and the level of trust one feels in general and to institutions in particular – correlates negatively with perceived borrowing constraints. At the same time, Georgarakos et al. (2015) establish the relation between social interaction with better-off peers, (higher) level of debt and financial distress. Given that both social interaction and trust are readily linked to two personality traits – extraversion and agreeableness – it can be one of the potential

channels how personality traits may affect both borrowing constraints and borrowing behavior in general.

A second potential mechanism through which personality may influence borrowing behavior and constraints is self-control. The negative effect of lack of self-control on loan repayments and indebtedness is well-documented (Gathergood, 2012). Using survey data on mature portfolios of European households Biljanovska and Palligkinis (2016) show that lack of self-control is associated with financial distress. They propose a composite measure of self-control, which includes three elements: goal-setting, monitoring and commitment to the goals. It is interesting that all three dimensions can be linked to locus of control.

It can be argued that essential drivers of both self-control and motivation is the belief an individual holds that his actions will lead to desired outcome (Cobb-Clark et al., 2016, and the references therein). In the subsequent empirical analysis Cobb-Clark et al. show the significant effects locus of control has on savings and assets accumulation. Interestingly, self-control, more particular the ability to control impulses and stick to the goals, is also one of the prime characteristics of the Big Five personality traits – conscientiousness, which has also been established to be a reliable and significant predictor of wealth accumulation and lower indebtedness. Our research contributes to this literature by studying locus of control and the Big Five personality traits simultaneously.

### 3. Data and Methodology

We use the Dutch Household Survey, which is longitudinal survey containing detailed questions on household assets and income, as well as expectations and behavior around borrowing. The sample frame is aimed to be representative for the Dutch population. Individuals are in the survey until they drop out, and we observe most households more than once. Households who dropped out, are replaced with households similar in key observable characteristics. We focus on the years 2005-2017, but in an extension we also use the earlier years 1993-2002. Since 2005, the survey contains regular series of questions on personality, namely a 50-item inventory for the Big Five and a 13-item survey for locus of control.

We create personality traits using factor analysis, and standardize the factors to have mean zero and a standard deviation of one. Since we have multiple observations for personality traits, as well as gaps in the years when there is no survey for traits, we experiment with several possibilities. In the main analysis we take each complete personality inventory of an individual, and impute the gap and the missing years with the most recent values for traits. In a robustness analysis (available upon request) we show that all results are qualitatively the same when we take the first measurement of personality. For certain personality traits there is an age-profile found in the literature, but on average personality traits have been found to be stable within person and within the population (e.g. Cobb-Clark and

Schurer, 2013, for locus of control; and Cobb-Clark and Schurer, 2012, for the Big Five).

Table 1 presents the summary statistics for the main regression sample. We have around 16,500 person-year observations for the Big Five personality traits, and a few more observations for locus of control (16,900). The control variables we include in each regression are: log of disposable household income and its square, whether the households owns a house, whether there is a spouse in the household, age and a quadratic in age. Furthermore, whether there are children present in the household, whether the household head has a college education or not, and whether the household lives in an urban area. We include four dummy variables to capture main economic activity, namely working, self-employed, retired and unemployed. The baseline is all other economic activities. In all regressions we also include a full set of year dummies.

In terms of outcome variables, we have two questions on whether households expect to be able to borrow money, either informally from family or friends, or formally. With respect to the informal channel, 33.7% of the households expects to be in a position where they can borrow a substantial amount. For the formal channel, 82.5% expects that their loan application would be approved if they would apply for a loan right now. For borrowing constraints we have the same two measures Jappelli (1990) uses: whether a

loan application in the past two years has been denied, or the individual did not receive as much credit as requested in the past two years. We condition this on actual loan applications, so that 3.7% of all loan applications is rejected. The second measure is taken for all households, and is whether a household thought of applying for a loan, but changed their mind, because they feared that their application might be rejected. In the population, 1.2% can be characterized as discouraged borrowers in a year. For the

evaluation after the loan application, we use questions on whether a household ever regretted taking out a loan (21.1%). Since 2013 a question is added whether households in a given year consulted with their bank after they foresee problems with repayment of a mortgage or a loan. For many households without a loan or mortgage this might not be applicable, and we condition this question on the subset of households leaving out the non-applicable answers (0.9% consulted with their bank).

**Table 1. Summary Statistics, 2005 - 2017**

	Mean	St. Dev.	Min	Max	N
<b>Outcome Variables</b>					
Could borrow from family and friends (1=yes)	0.337	0.473	0	1	14,701
Could get a formal loan (1=yes)	0.825	0.380	0	1	16,983
Applied for a loan (1=yes)	0.138	0.345	0	1	16,983
Loan application denied (1=yes)	0.037	0.188	0	1	2,346
Did not apply for a loan because of fear of rejection (1=yes)	0.012	0.108	0	1	16,983
Regret taking out a loan (1=yes)	0.211	0.408	0	1	9,160
Consulted with bank in anticipation of repayment problems (1=yes)	0.009	0.094	0	1	7,358
Ever had formal debt assistance (1=yes)	0.016	0.124	0	1	15,407
<b>Personality Traits</b>					
Locus of control	0.041	0.990	-3.79	2.48	16,983
Openness	-0.026	0.964	-3.77	3.09	16,533
Conscientiousness	0.042	1.024	-3.94	2.43	16,533
Extraversion	-0.023	1.016	-3.48	3.58	16,533
Agreeableness	0.009	0.974	-5.04	2.45	16,533
Neuroticism	-0.034	0.988	-2.45	4.16	16,533
<b>Background Characteristics</b>					
Log(household income)	9.803	0.949	0	13.4	16,983
Own House (1=yes)	0.753	0.432	0	1	16,983
Couple (1=yes)	0.778	0.416	0	1	16,983
Female	0.450	0.497	0	1	16,983
Age	53.64	15.84	19	90	16,983
City (1=yes)	0.400	0.490	0	1	16,983
Children in household (1=yes)	0.333	0.471	0	1	16,983
College (1=yes)	0.438	0.496	0	1	16,983
Employed (1=yes)	0.472	0.499	0	1	16,983
Self-employed (1=yes)	0.041	0.198	0	1	16,983
Unemployed (1=yes)	0.022	0.148	0	1	16,983
Retired (1=yes)	0.277	0.447	0	1	16,983
Other (1=yes)	0.188	0.391	0	1	16,983

Note: The outcome variable 'Loan application denied' is conditional on having applied for a loan. The variable 'Consulted with bank' is only asked in the years 2013-2017.

The last question deals with the formal trajectory of debt assistance, of which payment renegotiations and legal bankruptcy might be part. In the surveyed population, 1.6% has ever had debt assistance.

It is important to stress the need of a general household survey to study borrowing expectations and borrowing constraints. Asking the same questions to a survey of bank customers, or potential bank clients might result in severely selected samples. For example, households who do not expect to get a loan approved, most likely will not show up at a bank, and will be missing in a sample of bank clients.

Since all variables are binary, we estimate *probit* models (in Stata 13.1), with one exception. The questions on formal and informal loan expectations are likely to be correlated, hence we estimate a system of equations, where we allow the error terms to be correlated. A *t*-test on the estimated correlation will give guidance whether the estimation of a system is warranted. In all tables we report the marginal effects at the mean of all other variables.

Conceptually we think of personality traits as inputs in the process of a loan application. Other inputs in this process are financial knowledge (financial literacy) and experience. Our research is exploratory, and we do not have the guidance from a theoretical model, nor the exogenous variation to estimate a formal production function. Therefore we estimate reduced form regressions and explore how personality traits are related to borrowing expectations and borrowing

constraints. Although personality traits can be assumed to predate many of the outcomes we study, we are careful not to make strong causal claims that personality traits cause certain outcomes. Nevertheless we believe that exploring the correlational variation can be quite informative.

## 4. Results

We present three sets of main results, which can be grouped by: (1) expectations to borrow from family and friends on the one hand, and formal institutions on the other; (2) borrowing constraints; and (3) the role of personality traits in loan regret and loan renegotiations. One can think of this grouping as the three phases before, during and after the loan application.

### 4.1 Personality Traits and Loan Expectations

We use two survey questions simultaneously to measure loan expectations. The first question is whether a household believes to be in the position to borrow a substantial amount of money from friends or family. The second question is whether the household believes that their loan application (with a formal lending institution) would be accepted, if they need money now. We estimate both binary outcomes in a system of equations, using bivariate *probit*.

Our motivation is that formal and informal borrowing could very well be substitutes. Households that are not in a position to borrow from friends or family need to go to formal lending institutions, and vice versa. Note that borrowing from friends or family also presupposes that one has friends or family with wealth to loan. A negative response on this question can be due to the supply side, the demand side, or both. To a certain degree this may also be true for the formal lending channel in times of credit rationing. We assume that personality traits are only related to the demand side of household loans. We use the same set of

background characteristics in both equations, and present three sets of results. Columns 1A and 1B of Table 2 show how external locus of control is associated with the two outcomes, the middle two columns focus at the Big Five, and the last two columns include all personality traits together.

Internal locus of control is positively associated with both outcomes in columns 1A and 1B. The interpretation of the marginal effects is as follows. A 1 standard deviation increase in internal locus of control is associated with a 4.4 percentage point increase in the expectation that one can borrow from friends or family, and 3.6 percentage point increase in the expectation of having a loan application confirmed. The magnitude of the marginal effects is sizeable. There are two ways to assess the size of the magnitude.

First, the unconditional mean of being able to borrow from friends or family is 33.8% (last line in Table 2), and an increase of 4.4 percentage points is quite large relative to the mean. Second, a 1 standard deviation increase in locus of control has a much larger effect than a large increase in household income. A 10% increase in disposable household income is associated with approximately a 0.29 percentage point increase in borrowing from family and friends, and approximately 0.39 percentage point for formal borrowing. It is interesting to note that a higher income has the same effect on both outcomes, and not opposite effects. Higher income people

are in a better position to obtain a loan from a bank, since they have better repayment possibilities. Apparently the same mechanism also works with being able to borrow from family or friends. For age there are opposite effects. Older people are less likely to believe they can borrow from family and friends, and retired people are more likely to believe they will get a

positive loan application. The two equations are estimated simultaneously, and the correlation between the two error terms is positive, large and statistically significant from zero at 1% ( $\rho = 0.34$ ). The interpretation is that unobserved factors explaining borrowing from family and friends are positively correlated with the unobserved factors explaining formal loan expectations.

**Table 2: Borrowing Expectations and Personality Traits, 2005 - 2017**

	(1A) Family or Friends	(1B) Formal Loan	(2A) Family or Friends	(2B) Formal Loan	(3A) Family or Friends	(3B) Formal Loan
Locus of control	0.044*** (0.007)	0.036*** (0.004)			0.042*** (0.007)	0.034*** (0.004)
Openness			0.019*** (0.007)	-0.005 (0.005)	0.020*** (0.007)	-0.004 (0.004)
Conscientiousness			-0.001 (0.007)	0.013*** (0.004)	-0.005 (0.007)	0.010** (0.004)
Extraversion			0.023*** (0.007)	0.006 (0.004)	0.023*** (0.007)	0.006 (0.004)
Agreeableness			0.017** (0.007)	0.007 (0.005)	0.014* (0.007)	0.006 (0.005)
Neuroticism			-0.006 (0.007)	-0.011** (0.005)	-0.0001 (0.007)	-0.007 (0.005)
log(Household income)	0.029*** (0.009)	0.039*** (0.007)	0.036*** (0.010)	0.046*** (0.008)	0.029*** (0.009)	0.041*** (0.007)
Couple	0.040** (0.018)	0.081*** (0.011)	0.035* (0.019)	0.078*** (0.011)	0.038** (0.019)	0.080*** (0.011)
Female	-0.018 (0.016)	-0.005 (0.010)	-0.020 (0.017)	-0.007 (0.010)	-0.023 (0.017)	-0.010 (0.010)
Age/10	-0.075*** (0.009)	0.006 (0.004)	-0.079*** (0.009)	-0.002 (0.004)	-0.073*** (0.009)	0.003 (0.004)
Children in household	-0.016 (0.017)	-0.057*** (0.011)	-0.025 (0.017)	-0.064*** (0.011)	-0.018 (0.017)	-0.057*** (0.011)
City	0.003 (0.016)	-0.001 (0.010)	0.001 (0.016)	0.001 (0.010)	-0.0004 (0.016)	0.001 (0.010)
House owner	0.048** (0.019)	0.116*** (0.012)	0.060*** (0.019)	0.125*** (0.012)	0.050** (0.019)	0.116*** (0.012)
College education	0.094*** (0.016)	0.046*** (0.010)	0.099*** (0.016)	0.057*** (0.010)	0.088*** (0.016)	0.047*** (0.010)
Employed	0.042* (0.021)	0.102*** (0.013)	0.040* (0.022)	0.102*** (0.014)	0.041* (0.022)	0.102*** (0.013)
Self-employed	0.072** (0.036)	-0.022 (0.021)	0.067* (0.038)	-0.013 (0.022)	0.062* (0.037)	-0.019 (0.021)
Unemployed	-0.094** (0.039)	-0.097*** (0.021)	-0.107*** (0.041)	-0.107*** (0.022)	-0.096** (0.040)	-0.098*** (0.021)
Retired	0.014 (0.025)	0.032** (0.015)	0.019 (0.026)	0.034** (0.015)	0.014 (0.026)	0.030** (0.015)
$\rho$	0.340*** (0.025)		0.356*** (0.030)		0.356*** (0.025)	
Year fixed effects	Y	Y	Y	Y	Y	Y
Number of observations	16, 149	16, 149	15, 789	15, 789	15, 748	15, 748
Number of individuals	4, 289	4, 289	4, 064	4, 064	4, 027	4, 027
Mean dependent variable	0.338	0.817	0.339	0.817	0.339	0.817

Note: Each column represents marginal effects after bivariate probit estimations, at the means of all other variables. Each outcome is unconditional, e.g. on the probability that one can borrow a large sum of money from family or friends in columns (1A), (2A), and (3A). In the regressions a quadratic of variables age and (log of) net household income are added, which is taken into account calculating the marginal effects. Standard errors in the regressions are clustered at the level of the individual.\*/\*\*/\*\*\*/ correspond to 10%/5%/1% significance level.

Turning to the middle two columns, there are interesting patterns to note in personality traits. Where the sign of locus of control is the same for both beliefs, this is not the case for most of the Big Five traits. Openness to experience is positively associated with the belief that one can borrow from family or friends, but not statistically significant (and negative if anything) with the belief that one can borrow from a bank.

The same is true for the traits extraversion and agreeableness. Though a little smaller in size than locus of control, all effects are economically meaningful. Interestingly, conscientiousness and neuroticism play a role in the belief that one can obtain a loan if one applied right now, albeit with opposite signs. When we add all personality traits together, all findings are qualitatively the same, except for neuroticism. These results provide suggestive evidence that personality traits matter for loan expectations, and that different personality traits load on different lending channels.

#### **4.2 Personality Traits and Borrowing Constraints**

When we turn to actual loan applications, we use the survey question whether households have applied for a loan in the past two years. This can be a mortgage, a private loan, an extension of a line of credit, or another type of loan. The dependent variable is one if a household answered “yes” to at least one of these. Interestingly enough, we do not find any effect, other than agreeableness. This is perhaps not a surprising finding, given that the majority of the loans applied for are mortgage loans, home-ownership rates in the Netherlands are between 63.9-69.0% in the period studied and the vast

majority of home-owners finance their home with a mortgage. The effect on agreeableness is also small in size: a one standard deviation increase is associated with a 0.8 percentage point increase in the probability of taking out a loan, on an average probability of loan applications of 13.6%.

In columns 3-6 of Table 3 we study two measures of borrowing constraints. In columns 3-4 the dependent variable is one if a household is denied credit in the past two years, has not received as much credit as requested. The sample is conditional on having applied for a loan in the past two years, which is the subset of households in columns 1-2. In the last two columns we use the second measure of borrowing constraints, which is the question whether households thought of applying for a loan in the past two years, but changed their minds, because of fear that their application might be rejected. Jappelli (1990) calls this group “discouraged borrowers”.

The means of both groups are small, respectively 3.6% and 1.2%, but these numbers are comparable with Teppa et al. (2013). Borrowing constrained households consist of both groups together. When we look at personality traits, we find that the same personality traits load on both measures, which supports the idea that borrowing constraints can be measured by either question. Higher locus of control is associated with a lower probability of being borrowing constrained, and higher levels of neuroticism are associated with a higher probability. In terms of interpretation, people with higher levels of neuroticism are more easily discouraged, and individuals with a stronger external locus of



control are less easily discouraged. Interestingly, beliefs and outcomes are consistent, since a comparison of columns (4) and (6) shows that conditional on applying for a loan, more neurotic people are also more likely to be rejected. For

locus of control it is the opposite. Summarizing this subsection, we find that personality traits are strongly correlated with being borrowing constrained, with sizable magnitudes.

**Table 3: Borrowing Constrains and Personality Traits, 2005 - 2017**

	Applied for a Loan		Loan Application Denied		Discouraged Borrower	
	(1)	(2)	(3)	(4)	(5)	(6)
Locus of control	0.001 (0.003)	0.001 (0.003)	-0.010*** (0.004)	-0.008** (0.003)	-0.004*** (0.001)	-0.003*** (0.001)
Openness		0.002 (0.003)		0.001 (0.003)		0.001 (0.001)
Conscientiousness		-0.003 (0.003)		-0.002 (0.002)		-0.0004 (0.001)
Extraversion		0.003 (0.003)		-0.0004 (0.002)		-0.00003 (0.001)
Agreeableness		0.008** (0.003)		0.002 (0.003)		0.001 (0.001)
Neuroticism		0.003 (0.003)		0.006** (0.003)		0.003*** (0.001)
log(Household income)	0.013*** (0.004)	0.013*** (0.004)	-0.007 (0.005)	-0.006 (0.005)	-0.003** (0.001)	-0.003** (0.001)
Couple	-0.018** (0.008)	-0.018** (0.008)	-0.010 (0.007)	-0.009 (0.007)	-0.004* (0.002)	-0.004* (0.002)
Female	-0.015** (0.007)	-0.020*** (0.007)	-0.006 (0.008)	-0.010 (0.008)	-0.004* (0.002)	-0.005** (0.002)
Age/10	-0.039*** (0.004)	-0.038*** (0.004)	-0.007* (0.004)	-0.005 (0.003)	-0.004*** (0.001)	-0.004*** (0.001)
Children in household	-0.027*** (0.007)	-0.027*** (0.008)	0.009 (0.008)	0.007 (0.008)	0.001 (0.002)	0.002 (0.002)
City	0.001 (0.007)	-0.0004 (0.007)	0.005 (0.008)	0.003 (0.007)	0.003 (0.002)	0.003* (0.002)
House owner	0.083*** (0.009)	0.083*** (0.009)	-0.028*** (0.009)	-0.022*** (0.008)	-0.009*** (0.002)	-0.008*** (0.002)
College education	0.014** (0.007)	0.014** (0.007)	-0.012* (0.007)	-0.011* (0.006)	-0.003 (0.002)	-0.003 (0.002)
Employed	0.043*** (0.010)	0.042*** (0.010)	-0.011 (0.010)	-0.008 (0.009)	-0.005** (0.002)	-0.005** (0.002)
Self-employed	0.040** (0.016)	0.039** (0.016)	0.008 (0.012)	0.010 (0.010)	0.008*** (0.003)	0.008*** (0.003)
Unemployed	0.009 (0.022)	0.015 (0.022)	0.020 (0.015)	0.021 (0.014)	0.005 (0.003)	0.005 (0.003)
Retired	0.023* (0.014)	0.023 (0.014)	-0.011 (0.013)	-0.010 (0.012)	-0.002 (0.003)	-0.001 (0.003)
Year fixed effects	Y	Y	Y	Y	Y	Y
Number of observations	16,983	16,533	2,346	2,252	18,664	18,214
Number of individuals	4,397	4,113	1,445	1,364	4,551	4,267
Mean dependent variable	0.138	0.136	0.037	0.036	0.012	0.012

Note: Each column represents marginal effects after bivariate probit estimations, at the means of all other variables. The dependent variable in columns (1) and (2), 'In the past two years, has a request you (or your partner) made for credit been turned down?' is conditional on having applied for a loan. In the regressions a quadratic of variables age and (log of) net household income are added, which is taken into account calculating the marginal effect. Standard errors in the regressions are clustered at the level of the individual.\*/\*\*/\*\*\* correspond to 10%/5%/1% significance level.

**Table 4: Loan Problems and Personality Traits, 2005 – 2017**

	Regret Taking Out a Loan		Consult with Bank		Debt Assistance	
	(1)	(2)	(3)	(4)	(5)	(6)
Locus of control	-0.033*** (0.007)	-0.029*** (0.007)	-0.002** (0.001)	-0.002** (0.001)	0.0002 (0.001)	-0.0002 (0.001)
Openness		0.030*** (0.008)		-0.0004 (0.001)		-0.00001 (0.001)
Conscientiousness		-0.021*** (0.008)		0.001 (0.001)		0.001 (0.001)
Extraversion		-0.002 (0.008)		0.003** (0.001)		0.003** (0.002)
Agreeableness		0.026*** (0.008)		-0.001 (0.001)		0.003** (0.001)
Neuroticism		0.035*** (0.008)		0.001 (0.001)		-0.001 (0.001)
log(Household income)	-0.026** (0.011)	-0.026** (0.012)	-0.0002 (0.003)	-0.0003 (0.002)	-0.004** (0.002)	-0.003** (0.002)
Age/10	-0.039*** (0.009)	-0.032*** (0.010)	-0.000004 (0.001)	0.00002 (0.001)	-0.003* (0.002)	-0.003* (0.002)
House owner	-0.139*** (0.021)	-0.136*** (0.022)	-0.003 (0.003)	-0.002 (0.003)	-0.021*** (0.004)	-0.019*** (0.004)
Year fixed effects	Y	Y	Y	Y	Y	X
Household characteristics	Y	Y	Y	Y	Y	X
Number of observations	11,140	10,880	7,364	7,358	18,598	18,176
Number of individuals	3,363	3,187	2,814	2,809	4,510	4,247
Mean dependent variable	0.216	0.213	0.009	0.009	0.017	0.016

Note: Each column represents marginal effects after probit estimations, at the means of all other variables. The dependent variable in columns (3) and (4), "Have you, in year  $y$ , consulted with your bank, because you have or foresee payment problems with the repayment of a loan or mortgage?" is only asked in the years 2013-2017. In the regressions a quadratic of variables age and (log of) net household income are added, which is taken into account calculating the marginal effects. Standard errors in the regressions are clustered at the level of the individual. \*/\*\*/\*\* correspond to 10%/5%/1% significance level.

### 4.3 Personality Traits, Loan Regret, and Loan Problems

The survey contains several questions for what happens with the household after taking out loans. We focus on three questions. The first one is whether a household regrets ever having taken out a loan (columns 1 and 2 of Table 4). Unfortunately, this question is not tied to a specific loan mentioned in the survey. The second question is added to the survey after the Great Recession.

In columns 3-4 of Table 4 the dependent variable is whether a household has consulted with their bank in the last year, because they foresaw problems with the repayment of a loan or mortgage. Households could answer "not applicable" in case they did not have a loan or

mortgage, and we ignore these households. The last question is whether a household has ever had a trajectory of formal debt assistance, which is a process in which a household with loan problems makes a repayment plan. Debt restructuring can be part of this process, as is facilities of local municipalities to intervene with credit lines.

All personality traits, except for extraversion, are strongly correlated with loan regret. For openness, agreeableness and neuroticism this is a positive association. Our interpretation is that these traits are either correlated with loans that did not bring what one expected it to be (openness, neuroticism), or that households with these traits are more easily persuaded into credit (openness, agreeableness). Some evidence for the expectations channel is corroborated from

Table 2, where openness and agreeableness are relatively more associated with expecting informal lines of credit than formal lines. In line with this interpretation we find that internal locus of control and conscientiousness are negatively correlated with regret. For locus of control this could be that households take more responsibility for their actions, or that households with a higher degree of locus of control obtain better credit. The last interpretation is in line with the previous subsection, where we find that households with more internal locus of control are less likely to be denied credit. The findings on loan regret can potentially be important, if households consider applying for a new loan. Households who express loan regret might shy away from borrowing at all, substitute sub-optimally to other lines of credit, or switch to other loan providers.

The last four columns of Table 4 show a similar picture when households experience loan troubles. The personality trait of extraversion is important here, which so far has not been mentioned that often. Whether it is contact a bank when a household foresees loan trouble, or participating in a trajectory of debt assistance, extraversion is strongly and positively correlated with both outcomes. The magnitude is quite large, a one standard deviation increase in extraversion is associated with a 0.3 percentage point increase in consulting with a bank, and of similar magnitude in having had debt assistance. The unconditional means of both outcomes are quite small in the cross-section, 0.9% respectively 1.6%, which means that a 0.3 percentage point change is quite large. Where a higher degree of assertiveness is important for both outcomes, agreeableness is important as well for having had debt assistance, with the same order of

magnitude as extraversion. We interpret the negative association of locus of control on consulting with a bank that individuals with a more internal locus of control are less likely to get into loan trouble in the first place. However, though supported by the other results on locus of control, this conjecture is difficult to test with the existing data.

In all three phases of the loan process, from expectations to ex post evaluation, we find that personality traits are important in an economically meaningful way. As can be expected, different personality traits play different roles in the different stages of the loan process.

#### 4.4 Extensions

We present two extensions to the main set of tables. In the first extension we add proxies for self-assessed financial knowledge, time horizon and risk attitudes. We combine columns 3A and 3B from Table 2, and columns 2, 4, and 6 of Table 3 into one table. Self-assessed knowledge is the answer to the survey question "How knowledgeable do you consider yourself in financial matters?". Respondents can answer "Not knowledgeable", "More or less knowledgeable", "Knowledgeable", or "Very knowledgeable". We take the category "Knowledgeable" as the baseline. For time horizon the question reads "Which of the time-horizons mentioned below is in your household most important with regard to planning expenditures and savings?". Answers can range from "The next couple of months" to "More than 10 years from now", which we take as the baseline. The measure of risk attitudes is created from six statements on financial risk taking, and is used in Dohmen et al. (2017). We

use the first factor from the six statements, and standardize the created factor. We rerun all results with the three sets of variables included, and only report the marginal effects on the variables of interest.

The main finding from Table 5 is that all results on personality traits are qualitatively the same as in their respective columns in Tables 2 and 3. The magnitude of the marginal effects typically shrinks a little, but this is rarely more than a one percentage point decrease. Zooming into the respective columns, we do find patterns on the added variables that are consistent with one would expect. For example, people who assess themselves as not knowledgeable in financial matters are 2 percentage points less likely to apply for a loan (compared to people who assess themselves as knowledgeable), and very knowledgeable people are 2.8 percentage points more likely to apply for a loan. Also people with a shorter time horizon are more likely to apply for a loan than people with a very long time horizon. There is even a gradient: 4.9 percentage point increase for people whose time horizon is the next couple of months, and 3.5 percentage point for people whose most important time horizon is the next year.

None of these results spills over in the probability that a loan application is denied (column 2), which is not the case for the personality traits locus of control and neuroticism. Interestingly, self-assessed financial knowledge does not seem to play a role for being a discouraged borrower, but willingness to take more risks is. Also people with a medium time horizon – next couple of years to the next 5-10 years are less likely to be discouraged (compared to individuals with a very long time horizon).

Turning to the last two columns, which are again estimated with a bivariate probit, we find that higher risk taking is positively associated with the expectation to be able to borrow from friends or family, as well as the possibility to obtain a loan. We suspect that optimism could be an intermediate factor, but we have no measures of dispositional optimism in the survey. Financial knowledge plays an interesting role in the pair of outcomes. On the one hand, higher financial knowledge is positively correlated with the expectation to be able to borrow from friends and family (and with 9.5 percentage point the marginal effect is sizable). On the other hand, being not financially knowledgeable is associated with a 2.1 percentage point decrease in the expectation of being able to get a formal loan. The latter is intuitive, the former is a bit puzzling. In any case, personality traits are not proxies for financial knowledge, time horizon or risk attitudes – the effects of personality traits on borrowing constraints and borrowing expectations are over and beyond these measures.

The second extension uses the same summary set-up of columns as in Table 5, but with a different personality inventory and different years. In the early years of the Dutch Household Survey, the NEO-PI-R measure of Big Five and Locus of Control were not asked. Instead, a different personality inventory was asked, the 16PF (see Figure 2), which overlaps to some extent with the NEO-PI-R, but measures different aspects of personality in its own right. Just as NEO-PI-R scale, the 16PA test measures personality along the five aggregated dimensions. The 16PA scale includes Extraversion, Anxiety/Neuroticism, Self-Control/Conscientiousness, Tough-Mindedness, and Independence/Autonomy. In terms of

resulting characteristics of personality, the NEO-PI-R and 16PF could be considered similar (Cattell, 1996), with mappings between Extraversion and Neuroticism in both approaches. On the other hand, Agreeableness and Openness to Change - as measured by NEO-PI-R - are not well defined by 16PA. In the 16PA these two characteristics are related to both Independence and Tough-

mindedness. Importantly, the 16PF narrows Conscientiousness down to Self-Control/Impulse-control. This difference is very useful for our research, as it allows a better explanation of the effects attributed to the impulse-inhibition, and an interpretation of the effects of both conscientiousness and locus of control in the main setting.

**Table 5: Extension: Borrowing Constraints, (In)Formal Borrowing and Personality Traits, 2005 - 2017**

	(1) Applied for Loan	(2) Application Denied	(3) Discouraged	(4A) Family or Friends	(4B) Formal Loan
Locus of control	0.002 (0.003)	-0.008** (0.003)	-0.003*** (0.001)	0.044*** (0.007)	0.034*** (0.004)
Openness	0.0004 (0.003)	-0.0001 (0.003)	0.001 (0.001)	0.016** (0.007)	-0.006 (0.004)
Conscientiousness	-0.003 (0.003)	-0.003 (0.002)	-0.0002 (0.001)	-0.007 (0.007)	0.009** (0.004)
Extraversion	0.004 (0.003)	0.001 (0.002)	-0.0001 (0.001)	0.021*** (0.007)	0.003 (0.004)
Agreeableness	0.007** (0.003)	0.0004 (0.002)	0.001 (0.001)	0.015** (0.007)	0.006 (0.005)
Neuroticism	0.005 (0.003)	0.005* (0.002)	0.003*** (0.001)	-0.0004 (0.007)	-0.007 (0.005)
Financial knowledge: not	-0.020** (0.008)	-0.001 (0.006)	-0.003 (0.002)	-0.028 (0.019)	-0.021** (0.010)
Financial knowledge: yes	-0.0004 (0.007)	0.003 (0.005)	-0.002 (0.002)	0.005 (0.014)	0.004 (0.009)
Financial knowledge: very	0.028* (0.015)	0.005 (0.011)	0.0001 (0.003)	0.095*** (0.030)	-0.021 (0.021)
Time horizon: next months	0.049*** (0.015)	0.011 (0.011)	-0.0004 (0.003)	0.010 (0.028)	-0.031* (0.018)
Time horizon: next year	0.035** (0.015)	-0.010 (0.012)	-0.006 (0.004)	0.016 (0.027)	0.009 (0.018)
Time horizon: next couple of years	0.016 (0.015)	-0.008 (0.011)	-0.008** (0.004)	0.014 (0.027)	0.007 (0.018)
Time horizon: next 5-10 years	0.021 (0.016)	-0.009 (0.012)	-0.008* (0.004)	0.014 (0.027)	0.025 (0.018)
Risk taking	0.002 (0.003)	-0.0001 (0.003)	0.001* (0.001)	0.020*** (0.007)	0.009* (0.004)
log(Household income)	0.012*** (0.004)	-0.007 (0.006)	-0.002 (0.001)	0.020** (0.010)	0.037*** (0.007)
Age/10	-0.036*** (0.004)	-0.004 (0.003)	-0.003** (0.001)	-0.068*** (0.009)	0.002 (0.005)
House owner	0.083*** (0.009)	-0.019** (0.008)	-0.006*** (0.002)	0.045** (0.020)	0.113*** (0.012)
$\rho$				0.346*** (0.026)	
Year fixed effects	Y	Y	Y	Y	Y
Household characteristics	Y	Y	Y	Y	Y
Number of observations	15,301	2,009	16,954	14,680	14,680
Number of individuals	3,894	1,248	4,046	3,813	3,813
Mean dependent variable	0.131	0.036	0.012	0.336	0.818

Note: Columns (1)-(3) are estimated with Probit regressions, and columns (4A)-(4B) with a bivariate Probit. Each column represents marginal effects, at the means of all other variables. Baseline for "Financial knowledge" is "More or less knowledgeable", and for "Time horizon" is "More than 10 years". In the regressions a quadratic of variables age and (log of) net household income are added, which is taken into account calculating the marginal effects. Standard errors in the regressions are clustered at the level of the individual. \*\*\*/\*\*/\* correspond to 10%/5%/1% significance level.

Figure 2. 16PF Personality Traits scale

Low Range Descriptors	Personality Trait (16PF)	High Range Descriptors
Introverted, Socially Inhibited, Shy	Extraversion	Extraverted, Socially Participating, Bold
Low Anxiety, Imperturbable	Neuroticism/Anxiety	High Anxiety, Perturbable
Receptive, Open-Minded, Intuitive	Tough Mindedness	Resolute, Unsentimental
Unrestrained, Follows Urges	Conscientiousness	Self-Controlled, Inhibits Urges
Accommodating, Selfless, Dependent	Independence	Independent, Persuasive, Willful

Source: Adapted from Cattell and Mead (2008), and Rossier et al. (2004)

One of the prominent results is that when we measure personality traits with the 16PF, there does not seem to be much of a correlation between borrowing constraints and personality traits, neither for loan denials, nor for discouraged borrowing. This is a stark difference with the observed correlations in the main specification, where extraversion had strong predictive power for being borrowing constraint, and more agreeable people were significantly more likely to perceive themselves as borrowing-constraint. Given that theoretically extraversion in 16PF and NEO-PI-R are very similar, the difference is most likely due to the quality of the data<sup>3</sup>.

However, when we turn to expectations to borrow—either from friends and family, or from formal institutions, we find large and statistically significant effects for conscientiousness. The effects are qualitatively similar as in Table 2, but the interpretation is slightly different. Given that in the 16PF setting conscientiousness is much more narrow than in the NEO-PI-R, the result found here can be attributed to the self-control/impulse-control dimension of personality. Compared to the main setting in Table 2, it allows us to develop a better understanding why both locus of control and conscientiousness are significant, and have opposite effects.

Conscientiousness is the inhibition of impulses (which is negatively related to borrowing), where locus of control represents motivation (and is positively related to borrowing). Furthermore, the 16PF measure of conscientiousness is insignificant and has a positive sign, which is completely different on both accounts to the main setting, where both locus of control and conscientiousness are highly significant but have opposite effects. We interpret results, that locus of control – as before – represents preference for action-oriented behavior, while in this case the effect of conscientiousness is ascribed to being responsible and dutiful, just as in the literature illustrating the effect of conscientiousness on wealth accumulation and debt reduction.

Lastly, the positive, strongly significant and economically meaningful effects of Autonomy/Independence on actual loan applications as well as expected chance to borrow from friends and family probably reflects the social nature of this personality trait: people with high scores on Autonomy/Independence tend to value their social network, and in fact, may depend on it. This is additional evidence towards social capital being a mechanism behind some of the effects which personality traits have on loan expectations and borrowing behavior.

<sup>3</sup> In 1993-1996 years, the 32 items of the 16PA questionnaire was included in the DHS survey, 16 in one year and another 16 in the consecutive year, comprising two waves 1993/1994 and 1995/1996 when respondents took the whole test. However, in all the following waves till 2002 year only *half of the items* were included in the questionnaire. Thus, the same 16 items of the 16PA scale were included in the years 1993-2002, with exception of 1994.

**Table 6: Extension: Different Inventory of Personality Traits, 1993-2002**

	(1) Applied for Loan	(2) Application Denied	(3) Discouraged	(4A) Family or Friends	(4B) Formal Loan
Tough-mindedness 16PF	-0.005 (0.004)	-0.0002 (0.002)	0.001 (0.001)	-0.009* (0.005)	-0.008** (0.003)
Autonomy/Independence 16PF	0.013*** (0.004)	0.003 (0.002)	0.00003 (0.001)	0.015*** (0.005)	0.004 (0.003)
Conscientiousness 16PF	0.004 (0.004)	-0.003 (0.002)	-0.0001 (0.001)	-0.011** (0.005)	0.007** (0.003)
Extraversion 16PF	0.004 (0.004)	-0.001 (0.002)	0.0003 (0.001)	0.009* (0.005)	0.003 (0.003)
Emotional Stability 16PF	0.013*** (0.004)	-0.004 (0.003)	-0.001 (0.001)	0.011** (0.005)	0.005 (0.003)
log(Household income)	0.016*** (0.005)	-0.005 (0.004)	-0.001 (0.001)	0.016** (0.007)	0.016*** (0.005)
Age/10	-0.045*** (0.005)	-0.0003 (0.002)	-0.001 (0.001)	-0.060*** (0.006)	0.009*** (0.003)
House owner	0.096*** (0.011)	-0.027*** (0.007)	-0.012*** (0.002)	0.008 (0.014)	0.055*** (0.008)
$\rho$				0.351*** (0.025)	
Year fixed effects	Y	Y	Y	Y	Y
Household characteristics	Y	Y	Y	Y	Y
Number of observations	14,582	2,296	14,582	10,381	10,381
Number of individuals	6,801	1,781	6,801	5,601	5,601
Mean dependent variable	0.184	0.022	0.011	0.262	0.867

Note: Columns (1)-(3) are estimated with Probit regressions, and columns (4A)-(4B) with a bivariate Probit. Each column represents marginal effects after probit estimations, at the means of all other variables. In the regressions a quadratic of variables age and (log of) net household income are added, which is taken into account calculating the marginal effects. Standard errors in the regressions are clustered at the level of the individual. \*/\*\*/\*\* correspond to 10%/5%/1% significance level.

## 5. Conclusions

Although exploratory to a large extent, we document several correlations between personality traits and steps in the loan application process of a household. Given that most households do not apply for loans on a regular basis, and apply for mortgages maybe a couple of times in their lives, the evidence on personality traits we reported here can be a useful addition to the research on financial literacy and financial capabilities.

We find that personality traits are related to loan expectations, borrowing constraints, loan regret, and loan troubles. Locus of control is a personality trait that is persistently present in almost all results, adding to the body of evidence of the importance of locus of control. Also the Big Five traits show up in ways that can be expected.

We can think of several future avenues of research. For academic researchers a question could be how personality traits can be cast in a conceptual framework together with economic preferences and financial literacy, or financial capabilities. For applied research we can envision that the relationship between financial literacy and personality traits could be interesting, as well as the interaction of the two in designing interventions. A more pragmatic lesson is to collect measures of locus of control and of the Big Five in randomized control trials.

Finally, we find some suggestive evidence for personality traits and how individuals deal with loan problems, but our sample sizes are very small. Policy makers and financial institutions designing communication tools and debt solutions for households with financial distress should consider the role of personality traits.



## References

- Almlund, M., Duckworth, A. L., Heckman, J., & Kautz, T. (2011). Personality psychology and economics. In *Handbook of the Economics of Education* (Vol. 4, pp. 1-181). Elsevier.
- Biljanovska, N., & Palligkinis, S. (2016). Control thyself: Self-control failure and household wealth. *Journal of Banking & Finance*, in press.
- Brown, S., & Taylor, K. (2014). Household finances and the 'Big Five' personality traits. *Journal of Economic Psychology*, 45, 197-212.
- Cattell, H. E. (1996). The original big five: A historical perspective. *European Review of Applied Psychology/Revue Européenne de Psychologie Appliquée*.
- Cattell, H. E., & Mead, A. D. (2008). The sixteen personality factor questionnaire (16PF). The SAGE handbook of personality theory and assessment, 2, 135-178.
- Cobb-Clark, D. A., & Schurer, S. (2012). The stability of big-five personality traits. *Economics Letters*, 115(1), 11-15.
- Cobb-Clark, D. A., & Schurer, S. (2013). Two economists' musings on the stability of locus of control. *The Economic Journal*, 123(570).
- Cobb-Clark, D. A., Kassenboehmer, S. C., & Sinning, M. G. (2016). Locus of control and savings. *Journal of Banking & Finance*, 73, 113-130.
- Deaton Angus, S. (1991). Saving and Liquidity Constraints. *Econometrica*, 59(5), 221-248.
- Disney, R., & Gathergood, J. (2013). Financial literacy and consumer credit portfolios. *Journal of Banking & Finance*, 37(7), 2246-2254.
- Dohmen, T., Falk, A., Golsteyn, B. H., Huffman, D., & Sunde, U. (2017). Risk attitudes across the life course. *The Economic Journal*, 127(605).
- Duckworth, A., & Weir, D. (2010). Personality, lifetime earnings, and retirement wealth. Working paper, Michigan Retirement Research Center.
- Gathergood, J. (2012). Self-control, financial literacy and consumer over-indebtedness. *Journal of economic psychology*, 33(3), 590-602.
- Georgarakos, D., Haliassos, M., & Pasini, G. (2014). Household debt and social interactions. *The Review of Financial Studies*, 27(5), 1404-1433.
- Hackethal, A., Haliassos, M., & Jappelli, T. (2012). Financial advisors: A case of babysitters?. *Journal of Banking & Finance*, 36(2), 509-524.
- Heineck, G. (2011). Does it pay to be nice? Personality and earnings in the United Kingdom. *ILR Review*, 64(5), 1020-1038.
- Hurd, M., Duckworth, A., Rohwedder, S., & Weir, D. (2012). Personality traits and economic preparation for retirement, working paper.
- Jappelli, T. (1990). Who is credit constrained in the US economy?. *The Quarterly Journal of Economics*, 105(1), 219-234.
- Jappelli, T., Pischke, J. S., & Souleles, N. S. (1998). Testing for liquidity constraints in Euler equations with complementary data sources. *Review of Economics and statistics*, 80(2), 251-262.
- Landis, B., & Gladstone, J. J. (2017). Personality, Income, and Compensatory Consumption: Low-Income Extraverts Spend More on Status. *Psychological science*, 28(10), 1518-1520.
- Levinger, B., Benton, M., & Meier, S. (2011). The cost of not knowing the score: Self-estimated credit scores and financial outcomes. *Journal of Family and Economic Issues*, 32(4), 566-585.

- Mueller, G., & Plug, E. (2006). Estimating the effect of personality on male and female earnings. *ILR Review*, 60(1), 3-22.
- Norum, P. S. (2008). The role of time preference and credit card usage in compulsive buying behaviour. *International Journal of Consumer Studies*, 32(3), 269-275.
- Nyhus, E. K., & Webley, P. (2001). The role of personality in household saving and borrowing behaviour. *European journal of personality*, 15(S1).
- Parise, G., & Peijnenburg, K. (2017). Understanding the determinants of financial outcomes and choices: the role of noncognitive abilities. Working paper.
- Perry, V. G., & Morris, M. D. (2005). Who is in control? The role of self-perception, knowledge, and income in explaining consumer financial behavior. *Journal of Consumer Affairs*, 39(2), 299-313.
- Rossier, J., Meyer de Stadelhofen, F., & Berthoud, S. (2004). The hierarchical structures of the NEO PI-R and the 16 PF 51. *European Journal of Psychological Assessment*, 20(1), 27-38.
- Salamanca N., de Grip A., Fouarge D, Montizaan R. (2016). Locus of control and investment in equity. Working paper.
- Teppa F., Porpiglia A., Ziegelmeyer M., Blanc J., Zhu J. (2013). Household saving behavior and credit constraints in Euro Area. Working paper
- Zeldes, S. P. (1989). Consumption and liquidity constraints: an empirical investigation. *Journal of Political Economy*, 97(2), 305-346.

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