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# The relationship between perceived peer income and household's borrowings

## The moderating effect of the Big Five personality traits

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MSc. Finance Thesis

# The relationship between perceived peer income and household's borrowings: the moderating effect of the Big Five personality traits

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**Abstract**

What motivates individuals to incur debt? Previous research indicated that the perceived income of members from one's social circle has a positive influence on both the likelihood of owning loans as well as the outstanding amount of these loans. An interesting find of which less is known about variables that could possibly moderate this effect. The present study investigates the moderating effect of the big five personality traits on the relationship between perceived peer income and household borrowings. A large household survey of 2154 observations representative for the Dutch population was used to test this proposition. A negative moderating effect of neuroticism and conscientiousness was revealed on the positive association between perceived peer income and the likelihood of owning collaterized debt. Clear theoretical and practical implications are provided, along with possible directions for further research. (JEL D14, G40, G41)

June 7th, 2018. Supervised by: V. Angelini, v.angelini@rug.nl.

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## 1. INTRODUCTION

Since the financial crisis of 2008, the amount of household borrowings has become a topic of increasing interest. Household debt encompasses *"all liabilities that require payment or payments of interest or principal by household or the creditor at a date or dates in the future"* (OECD, 2018). It enables individuals to consume and invest today, while sacrificing some of their future income. Incurring debt can hence provide a short-term economic growth, but the past has shown that a relatively small selection of highly indebted individuals can cause a significant shock to the market (International Monetary Fund, 2017). The total debt of Dutch households increased from 673 billion euros in 2008, to 761 billion in 2017 (CBS, 2018). This raises concerns of economic sustainability, as Lombardi, Mohanty and Shim (2017) find that a one percentage point increase in household debt-to-GDP ratio leads to a long-term decrease in economic growth of more than one percent. This is explained by the reduction in investing, lending and consumption, necessary to pay down the contracted debt burden. Given the possible financial distress and the effects on economic growth of certain household debt levels, it is interesting to identify what drives households to incur (more) debt.

One of such drivers is the degree to which individuals view their circle of acquaintances as having higher average incomes. An individual's circle of acquaintances consists of the people with whom he/she associates frequently. "Keeping up with the Joneses" is a phrase often used to illustrate a person's social comparisons in terms of possessions and income, and the respective decreases in happiness in case others' possessions and income increase (Gali, 1994). Research shows that households are more inclined to have outstanding and sizeable loans if they perceive their peers as wealthier compared to themselves (Georgarakos, Haliassos and Pasini, 2014). This finding is explained by notable consumption behavior. If the consumption level of someone with a high income increases, so does the consumption of their poorer relatives. Moreover, if drops in income occur, people tend to maintain their consumption level for as long as possible (Barba and Pivetti, 2008). This behavior is caused by the desire to outspend others and to compete for status (Basu, 1989). Remarkably, this type of consumption is often financed with debt (Becker and Rayo, 2006). Despite the study of Georgarakos, Haliassos and Pasini (2014) which examines the relationship between the perceived peer income and household's borrowings, less is known about moderators that could possibly affect this relationship. This lack of research is addressed by the present paper.

Personality has an important influence on the money management of individuals (Donnelly, Iyer, and Howell, 2012), and is often described by so-called personality traits. Personality traits can be defined as: *"the relatively enduring patterns of thoughts, feelings, and behaviors that reflect the tendency to respond in certain ways under certain circumstances"* (Roberts, 2009, p. 140). Several studies recognized the importance of personality traits for certain financial behaviors or economic outcomes. Yazdanparaz and Alhenawi (2017) for instance, indicate that individuals with a high need for arousal have both a positive attitude and intention towards borrowing. The present study follows the most widely used model to identify personalities, which is the big five inventory of Costa and McCrae (1992). This model classifies individuals based on the following five traits: openness to experience, conscientiousness, extraversion, agreeableness and neuroticism. Some personality characteristics like less agreeable, less conscientious or more neurotic, tend to be more concerned about their relative income (Friehe, Mechtel and Pannenberg, 2017). They may therefore have a stronger tendency to outspend people from their social circle and subsequently, incur debt in order to finance it. Interestingly, some of the big five personality traits have been positively associated with debt holdings, such as extraversion, agreeableness, neuroticism and openness to experience (Brown, and Taylor, 2014). Conscientiousness on the other hand, was found to be negatively related to the amount of debt. Based on these findings, the big five personality traits possibly moderate the relationship between perceived peer income and household borrowings.

This empirical paper contributes to the existing body of literature by examining the moderating effect of the big five personality traits on the relationship between perceived peer income and household borrowings. In doing so, I will follow the methodology of Georgarakos, Haliassos and Pasini (2014), who studied the effect of social interactions and household borrowings by using the Dutch National Bank Household Survey (DNBHS). This is a dataset which is representative for the entire Dutch population. I extend on their study by examining the moderating effect of the big five personality traits on their main finding: perceived peer income has a positive influence on household debt. This has, to the best of my knowledge, not been done before. Furthermore, Georgarakos, Haliassos and Pasini (2014) look at the period of 2001 to 2008, which is right before the financial crisis. Their data and outcomes may have been related to the run-up of this crisis. The present study puts their findings in a new economic perspective by using the Dutch National Bank Household Survey (DNBHS) of 2017.

The remainder of this paper is organized as follows. I will proceed by elaborating on the introduced concepts and relations, followed by six testable hypotheses. The used sample, measures and methods are covered in part 3. Lastly, the results will be presented and discussed in respectively part 4 and 5.

## 2. LITERATURE REVIEW

**Perceived peer income and household debt**

Humans have the tendency to evaluate their behavior, opinions and skills, by comparing themselves to persons who are similar to them on certain dimensions (Festinger, 1954). One typical dimension of comparison is income. Guven and Sørensen (2012) investigated the effect of income on self-reported happiness, using a General Social Survey (GSS) among 3000 individuals from the U.S. They found that an individuals' relative income, compared to others within the direct social environment, has a stronger influence on reported subjective well-being than their absolute level of income. Additionally, the perceived relative income of an individual is closely related to the actual relative income. Similar results to the findings of Guven and Sørensen (2012) about relative income were reported in Europe (Caporale *et al.,* 2009) and Asia (Oshio, Nozaki and Kobayashi, 2011). An additional insight to this finding is provided by Cheung and Lucas (2016). Their multilevel analysis of 1.7 million individuals from 2,425 U.S. counties showed that higher income inequalities increased the frequency of social comparisons and subsequently, lead to stronger relative income effects. These positional concerns drive individuals with a lower level of income to change their economic decisions in order to mimic the financial behavior of their peers.

Consumption is particularly subject to status concerns and social norms that emerge from comparisons of oneself to (usually wealthier) friends, neighbors, colleagues and other acquaintances. The link between perceived income and consumption decisions has been well documented in the literature and goes back as far as 1949. Duesenberry (1949) argued that a person's consumption decisions not merely depend on his or her own needs and income, but also on the income level of others. This social dimension of consumption causes households with lower incomes to increase their expenditures if the consumption of higher income level households increases. The study of Bricker, Ramcharan and Krimmel (2014) demonstrated the relevance of Duesenberry's findings in more recent times. By combining data from the American survey of consumer finances

and neighborhood data of the American Community Survey (ACS), they point out the following. A household's income rank on the relative income distribution of its peers is positively related to the amount of money devoted to high status cars. The aim of this enhanced car spending is to signal (an increase in) their relative income position as a means of "keeping up with the Joneses".

Purchasing goods with the aim of advertising wealth or status is known as conspicuous consumption (Veblen, 1833). Such goods are also known as Veblen-goods, named after Torstein Veblen, who was the first to identify this behavior. The significance of this signaling-by-consuming is pointed out by Heffetz (2011). The main finding of his research was that income elasticity for conspicuous goods tends to be higher for more visible goods. That is, the demand of the more visible goods increases at a higher pace than the demand of less visible goods of a certain price level when income increases. Subsequently, Heffetz (2011) developed a visibility measure for goods which is able to predict up to one-third of the variation in consumption elasticity across different consumption categories in the United States. In line with these findings, status goods also tend to be durables (Rayo and Becker, 2006). Non-durable goods on the one hand, only have a short term status enhancing effect. The impression of luxurious dinner for example, only lasts until you leave the restaurant. On the other hand, durable goods such as cars or luxury watches remain visible for others for a long time after purchase.

Differences in perceived incomes thus influence consumption, but how is this consumption financed? An individual's consumption pattern is relatively easily observable for outsiders. Less visible however, is the way in which these goods are financed. Continuously catching up your consumption level with that of your peers, and participating in the race for status, will require regularly purchasing (durable) goods on a long time frame. It is therefore plausible that households increase their borrowings with the purpose of financing this consumption behavior. This may be explained by the fact that comparisons of relative income have an influence on a person's risk attitude (Schmidt, Neyse and Eleknonyte, 2015). In their field experiment with 240 individuals, they examine the effect of income inequality and risk taking. The experiment showed that people are willing to take on higher risks in order to close the income gap with their richer relatives, even if increased possibilities of financial distress exist. This change in risk attitude is expressed by taking risky investments. Additional risk may be taken on by financing these investments with (large amounts of) debt.

Consumption that originates from social influences is not necessarily funded with debt. Georgarakos, Haliassos and Pasini (2014) argue that households may for example lower their level of savings, increase their working hours or reduce spending on other (less visible) goods. With the purpose of investigating the financing of comparison-motivated consumption, they performed a longitudinal study from 2001 to 2008, drawing from a sample of 4,500 households form the Dutch National Bank Household Survey (DNBHS). They find evidence for social influences on household borrowings. More specifically, they point out that individuals who perceive others in their social circle as having higher average net incomes show a stronger tendency to mimic their consumption, and subsequently borrow more. These findings still held, after controlling for household resources, household characteristics and the possibility borrow from, or receive financial advice from your social circle. Although the present study examines survey data of a more recent economic period, it is expected that the effect of perceived peer income on household borrowings as indicated by Georgarakos, Haliassos and Pasini (2014) is still present in 2017. This is hypothesized by the following hypothesis:

- *Hypothesis 1: Perceived peer income is positively related to household loans*

**Perceived peer income, household loans, and the moderating effect of the big five personality traits.**

Since the importance of personality in financial decision making has been stressed, personality traits have been subject to several studies. The aim of the present paper is to investigate if an individual's personality, in terms of the big five traits, moderates the association between perceived peer income and household debt. The paper of Friehe, Mechtel and Pannenberg (2017) can shape my expectations. They investigated the influence of the Big Five on positional income concerns (PIC), using the German Socio-Economic Panel (SOEP), which is a questionnaire that is representative for the German population. They provide evidence of who (in terms of a big five personality trait) compares to whom (in terms of a reference group), when it comes to positional income concerns. Significant positional income concerns were found for agreeableness, conscientiousness and neuroticism with respect to reference groups including friends, age group, partner, parents, colleagues and neighbors. Coworkers and people with the same occupation proved as the most important reference groups across the different personality traits.

Brown and Taylor (2011) indicated that personality traits have effects on debt and

asset holdings. Their results were based on the analysis of a dataset obtained from the British Household Panel Survey (BHPS) of 2005. This panel survey was executed by the Institute for Social and Economic Research (ISER) and consists of approximately 10,000 annual individual interviews. An analysis of this survey indicated a positive effect of extraversion, agreeableness, neuroticism and openness to experience on debt holdings. Conversely, conscientiousness was negatively associated with debt holdings. Another study that examined the effect of the big five personality traits on borrowing behavior was performed by Nyhus and Webley (2001). They used the CenTEr Saving Survey (CSS). Similar to the dataset used in the present research, their dataset included asset, debt and personality information and was also representative of the Dutch population. The importance of the Big Five personality traits in explaining household debt was highlighted by this study, as similar results for extraversion, agreeableness and neuroticism were reported compared to the outcomes of Brown and Taylor (2011).

Based on the findings of Friehe, Mechtel and Pannenberg (2017), Brown and Taylor (2011) and Nyhus and Webley (2001), it is expected that the Big Five personality traits moderate the relationship between perceived peer income household borrowings. I will proceed by covering each big five personality trait individually, followed by a testable hypothesis of the expected moderating effect on this relationship.

### *Extraversion*

The extraversion trait relates to being talkative, openly expressive and the tendency to be very sociable (Borghans *et al.,* 2008). According to Nyhus and Webley (2001), social interactions not only involve spending in general, they are also accompanied by an increased frequency of social comparisons. Because extraverts regularly meet with others of their social circle, they are often exposed to the (conspicuous) consumption habits of these people. That exposure motivates individuals who perceive their peers as having a higher income to show a strong tendency of "keeping up with the Joneses". This social influence increases their likelihood of attracting (more) borrowings. Introvert people are less likely to show this borrowing behavior, as introverts meet less often with their social circle and engage less in social comparisons. Based on the above reasoning, it is expected that extraversion positively moderates the relation between perceived peer income and the amount of household borrowings. This expectation is captured by the following hypothesis:

- *Hypothesis 2: extraversion positively moderates the relationship between perceived peer income and household loans*

**Agreeableness**

Agreeableness reflects a person's likeableness, warmness and cooperativeness in teamwork and social interactions (Borghans *et al.,* 2008). Warmness and cooperativeness towards others make such persons less sensitive to differences in perceived income, which is confirmed by Friehe, Mechtel and Pannenberg (2017). Interestingly, Nyhus and Webley (2001), found a significant relation between agreeableness and amounts of debt outstanding. This may be explained by the overlap of the agreeableness and the extraversion personality trait. Similar to extraverts, agreeable individuals like to spend time with others. Though agreeable people are not sensitive to perceived differences in income, they may still find psychological satisfaction in keeping up with others' spending behavior. Literature provides no clear indication for the direction of for the agreeableness moderator in the relationship between perceived peer income and household borrowings. Based findings the findings of Nyhus and Webley (2001) and the fact that some characteristics of extraverts prevail in the agreeableness personality trait, a positive moderating effect is expected. The following hypothesis denotes this effect:

- *Hypothesis 3: agreeableness positively moderates the relationship between perceived peer income and household loans*

**Conscientiousness**

Conscientiousness describes ambitious, hardworking, well-organized, self-disciplined and rule-following persons that are committed to efficiently completing their tasks (Borghans *et al.,* 2008). Warneryd (1996) argued that this personality trait is a strong predictor of borrowing behavior. That is explained by the high financial self-control and the ability to delay gratification which individuals with this trait have. The ability to delay gratification makes them insensitive to a (higher) perceived income of their peers. This insensitivity is confirmed by findings of Friehe, Mechtel and Pannenberg (2017), who found no significant relation between conscientiousness and positional income concerns. High financial self-control is expressed by conscientious people in the tendency to make well-planned financial decisions. As a result, they are inclined to save more prior to making an investment (Harley and Wilhelm, 1992). This decreases the need for attracting debt and thus the likelihood of having high outstanding amounts of debt. The conscientiousness personality trait is hence expected to negatively moderate the relation between perceived

peer income and household loans. Therefore, the following hypothesis is posed:

- *Hypothesis 4: conscientiousness negatively moderates the relationship between perceived peer income and household loans*

**Neuroticism**

Neuroticism is described as being vulnerable to unpleasant emotions, insecure and self-conscious (Borghans *et al.,* 2008). Insecurity causes these individuals to compare themselves often to others of their social circle. Hence, they are especially sensitive to the perceived income level of their peers (Friehe, Mechtel and Pannenberg, 2017). In order to fulfil the short-term desire of catching up with their peers' consumption, they often engage in impulsive buying. As opposed to a conscientious personality, the neurotic individual is less able to delay gratification (Nyhus and Webley, 2001). This has a particularly negative effect on the financial self-control and planning abilities of such individuals. The outcomes are accordingly the reverse of conscientious behavior. That is, they are usually not capable of making financial decisions or adhere to budgets. Thus, based on a strong tendency to "keep up with the Joneses" combined with bad financial planning and decision making, it is expected that neuroticism positively moderates the relationship between perceived peer income and household loans. This is reflected by the following hypothesis:

- *Hypothesis 5: neuroticism positively moderates the relationship between perceived peer income and household loans*

**Openness to experience**

Openness to experience describes whether someone has broad interests, a high curiosity and prefers change and novelty over fixed routines (Borghans *et al.,* 2008). This curiosity and thrill seeking behavior is expressed by a willingness to try new products and services which explains the findings regarding financial asset holdings of Brown and Taylor (2014). Their research indicated that openness to experience had a strong influence on financial asset- and debt holdings. Higher debt burdens are incurred by these individuals as a trade-off of psychological satisfactions. Friehe, Mechtel and Pannenberg (2017) found no significant perceived peer income concerns among individuals with a high openness. The direction of the moderating effect is hence ambiguous. Based on the evidence above, it may be possible that openness to experience positively moderates the association between perceived peer income and household borrowings. Hypothesis 6 is formulated accordingly:

- *Hypothesis 6: openness to experience positively moderates the relationship between perceived peer income and household loans*

## 3. DATA

### Sample

In order to test the hypothesized model, detailed information is required about the total borrowings of households. Acquiring details on a household finances is challenging because personal financials are usually not easily observable. This is explained by a reluctance among people to provide such financial information. The dataset should further allow for a reliable determination of an individual's personality score on each of the big five personality traits. Lastly, information is needed on an individual's perception on the level of income of other people in their social circle. A dataset that combines these three aspects is made available by the Dutch National Bank.

The sample for the present study is drawn from the Dutch National Bank Household Survey (DNBHS). This unique dataset, annually collected by CenTErdata, is representative for the entire Dutch speaking population. It consists of six parts: general information on the household, household and work, accommodation and mortgages, health and income, assets and liabilities, economic and psychological aspects. This allows for investigations on both the psychological and economic aspects of financial behavior, which makes this dataset particularly suitable for this study. The big five personality questions, as a segment of the psychological part of the questionnaire, is not present in every year's wave of the survey. This study is therefore limited to the most recent questionnaire from 2017.

The initial dataset consisted of 5032 observations and included all members of the household, also those under 16 years of age. For that reason, not every household member was able to fill in questions with regard to for example household finances. Furthermore, several respondents failed to complete the entire survey. These observations had to be removed from the dataset. After controlling for incomplete surveys and missing information for the main questions interest, the final sample consisted of 2154 observations. Table 1 summarizes several demographics of the final sample and the social circle of individuals from the final sample.

The average household of the drawn sample consisted of 2 individuals (standard deviation = 1.22) and 69% of them were partners. Of the respondents, 1133 (52.60%) were male and 1021 (47.40%) were female. Most of them had a college degree (63.32%). Their age ranged from 19 to 94, with an average of 54.58 (standard deviation = 16.39) years old. Further, 1125 respondents were employed, of which 106 were self-employed and 589

retired. The second part of the table covers demographics for the social circle of the respondents. I will further elaborate on them, along with perceived peer income, in the "measures" section.

Table 1: Various demographics of the final sample (1) and the social circle of individuals from this sample (2), along with their mean and standard deviation (SD). The total number of observations in the final sample is 2154.

| Variable | Mean | SD |
|---|---|---|
| **1. Summary of sample:** | | |
| Age | 54.58 | 16.39 |
| Male | 0.53 | 0.50 |
| Couple | 0.69 | 0.46 |
| Number of children | 0.46 | 0.89 |
| Net household income | 34,602 | 18,270 |
| *Education dummies:* | | |
| High school degree | 0.34 | 0.47 |
| College degree | 0.63 | 0.48 |
| Other education | 0.03 | 0.16 |
| No education | 0.00 | 0.02 |
| *Labor market status dummies:* | | |
| Employed | 0.47 | 0.50 |
| Self employed | 0.05 | 0.22 |
| Unemployed | 0.27 | 0.45 |
| Retired | 0.03 | 0.17 |
| Other status | 0.18 | 0.38 |
| *Health status dummies:* | | |
| Health: poor | 0.60 | 0.40 |
| Health: fair | 0.20 | 0.10 |
| **2. Summary of social circle:** | | |
| Age | 51.55 | 14.07 |
| Number of people in household | 2.59 | 1.03 |
| Perceived average total net income per year | 37,024 | 17,098 |
| Less than high school | 0.00 | 0.06 |
| High school | 0.62 | 0.49 |
| College degree | 0.38 | 0.48 |
| Employed | 0.71 | 0.45 |
| Self employed | 0.06 | 0.23 |
| Unemployed | 0.23 | 0.42 |
| Male average working hours per week | 36.84 | 8.37 |
| Female average working hours per week | 26.68 | 8.78 |

## Measures

### *Household borrowings*

The total amount of household borrowings is determined by taking the sum of all formal debt sources. That includes debts on hire-purchase contracts, debts based on payment by

installment, debts with mail-order firms, shops or other retail business, mortgages on the main house, mortgages on the second house or mortgages on other pieces of real estate, private loans, extended lines of credit (unrelated to home equity), study loans, credit card debts, checking account deficits and other loans. Unformal debt, for example a loan from family or friends, is not included in the total amount of household borrowings.

The amount of debt for each above mentioned subcategory is measured as follows. Respondents are asked if they have a certain type of loan, followed by a question to estimate the amount (in case the presence of a loan is indicated) of the loan that is left at the present. When the respondent is unable to give the exact answer, he or she is asked to estimate the remaining debt by selecting from a sequence of brackets (less than 50 euros, between 50 euro and 250 euro, …, 25.000 euro or more). If no bracket were selected, the answer is treated as a "don't know" answer. The midpoints of the brackets, or the left bound in case the upper bracket answer was selected, were used in the reported results if a bracketed answer was given. This procedure of treating bracketed answers was published in the "codebook" of the questionnaire, which is published by CentERdata along with the questionnaire data. The answers for the different sub-loan types were then added up in order to derive the total amount of household debt.

Household borrowings were held by 44.04% of the households. Among households whom had debt outstanding, the amount varied from 14 euros to a maximum of 1,075,000 euros. The median conditional amount of debt outstanding was 92,000 euro (standard deviation = 125,633).

*Personality*

The respondent's personality is categorized with the big five personality traits developed by Costa and McCrea (1992): extraversion, agreeableness conscientiousness, neuroticism and openness to experience. The questionnaire contains 10 questions for each personality trait as suggested by Goldberg (1992), yielding a total of 50 questions. All questions were answered on a 5-point Likert (1932) scale. An example item is: "I am the life of the party (1 not at all applicable 5 highly applicable)". Some questions needed to be recoded in order to make the questions for a particular personality trait comparable. The full set of personality questions, whether a question required recoding, along with their means and standard deviations can be found in appendix A.

Subsequently, the internal consistency of each set of 10 questions was tested by calculating the Cronbach's alpha. This value determines if a sum variable can be created

from each set of questions that truly represents the underlying construct, in this case a certain personality trait. Values of $0.8 > \alpha \geq 0.7$ are considered as acceptable and values of $\alpha > 0.8$ are considered as good. As all values are well above 0.7, a total score for each personality trait was calculated by taking the average of each of the grouped questions (see table 2).

Table 2: Cronbach's alpha, mean and standard deviation for summed personality traits.

| Big five personality trait | Cronbach's alpha | Mean | SD |
|---|---|---|---|
| Extraversion | 0.85 | 3.06 | 0.66 |
| Agreeableness | 0.86 | 3.90 | 0.57 |
| Conscientiousness | 0.76 | 3.64 | 0.53 |
| Neuroticism | 0.89 | 2.43 | 0.69 |
| Openness to experience | 0.76 | 3.31 | 0.46 |

*Perceived peer income*

Respondents are asked a series of questions about their circle of acquaintances. This includes questions about their peers' age, number of people in household, education, employment status and the average amount of working hours per week by men/women of the regarding household (given working hours > 0). The second part of table 1 shows the descriptive statistics of these aforementioned questions. The average age of individuals with whom respondents associate frequently is 51.55 (standard deviation = 14.07). The household of these individuals consists on average of 2.59 members (standard deviation = 1.03). Most of them held a high school degree (61.88%) and the majority was employed (77%). The working males in the respondent's social circle work on average 36.84 hours a week (standard deviation = 8.37) and the females work 26.68 hours per week on average (standard deviation = 8.78).

Information about the average perceived income per year of this group is collected by the following question: "How much do you think is the average total net income per year of households in your circle of acquaintances? Respondents were able choose from 6 bracketed options: less than 10,000 euro, between 10,000 and 14,000 euro, between 14,000 and 22,000, between 22,000 and 40,000, between 40,000 and 75,000, 75,000 euro or more. The average perceived net peer income per year was determined by taking the midpoint of each closed bracketed answer. The upper and final-open ended bracket is treated differently compared to that of debt questions with bracketed answers. For the regarding open-ended income bracket, a 'midpoint' was determined by extrapolating from the first-

last income category, as recommended by Hout (2004). The average perceived net peer income per year was 37,024 euros (standard deviation = 17,098; see table 1).

The resulting values were further adjusted, as they were subject to non-linear effects. That is, the average perceived net peer income is positively skewed (skewness = 0.58). The values are corrected for this skewness by taking the Inverse Hyperbolic Sine (IHS; $\log(x + \sqrt{(x^2 + 1)})$ ). This method of dealing with dealing with skewness is preferred over taking the natural logarithm, as the IHS is defined for zero values.

**Methods**

The hypothesized model will be tested as follows. A correlation analysis was performed as a first examination of relatedness between the variables in the proposed model. Thereafter, two Ordinary Least Squares (OLS) regression analyses were conducted to formally test the model. The regression analyses were estimated by the following equation:

$$y_i = a_i + \beta_1 z_i + \beta_2 x_{ki} + \beta_3 z_i x_{ki} + \beta_4 v_i + \varepsilon_i \tag{1}$$

In the first regression analysis, $y_i$ represents a dummy variable which indicates the ownership of a loan ($y_i = 1$) or not ($y_i = 0$). The fitted values from this regression are the estimated probabilities for having a loan ($y_i = 1$). Further, $z_i$ denotes the perceived average net peer income. $x_{ki}$ represents the personality trait, where $k = 1st, \dots, 5th$ big five personality trait. $z_i x_{ki}$ is an interaction term of the perceived average net peer income and personality trait $k$. This term captures the moderating effect of personality. Lastly, $v_i$ and $\varepsilon_i$ represent a vector of different control variables and the error term, respectively.

For the second regression analysis, $y_i$ represents the logarithmic amount of debt outstanding, under the condition that a loan is owned ($y_i = 1$). The outcome of this regression reveals the estimated effect of the explanatory variables on the conditional amount of debt outstanding. The other variables are defined as for the first regression analysis.

## 4. RESULTS

**Correlation analysis**

Table 3 shows the results of the performed correlation analysis. As anticipated, the correlation analysis revealed that perceived peer income is positively associated with household loans ($r = 0.24$, $p < 0.01$). Unexpectedly, no significant correlations were found between extraversion, agreeableness, conscientiousness and household loans. The

table further shows that neuroticism is significantly negatively related to household loans ($r = -0.06$, $p < 0.01$). Lastly, openness to experience showed a significant and positive correlation with household loans($r = 0.10$, $p < 0.01$).

Table 3: Correlation analysis results. Corresponding significance levels are indicated by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Perc. peer income | 1 | | | | | | |
| 2. Extraversion | .05** | 1 | | | | | |
| 3. Agreeableness | .06** | .29*** | 1 | | | | |
| 4. Conscientiousness | .08*** | .12*** | .33*** | 1 | | | |
| 5. Neuroticism | -.11*** | -.20*** | -.24*** | -.31*** | 1 | | |
| 6. Openness to exp. | .13*** | .31*** | .28*** | .18*** | -.07*** | 1 | |
| 7. Household loans | .24*** | .02 | -.00 | .02 | -.06*** | .10*** | 1 |

## Regression results: total household loans

The regression results for total household loans are shown in table 4. A statistically significant effect was estimated for the average perceived net peer income per year on the probability of having a household loan outstanding. This provides evidence for hypothesis 1. However, no significant effect was found when regressing the amount of household borrowings on the average peer income. This indicates that perceived peer income only has an influence on the likelihood of having a loan outstanding, and not on the conditional amount. None of the five personality traits was directly associated with the likelihood of having household loans or the conditional amounts outstanding. Contradictory to what was expected, no moderating effects were found for the big five personality traits on the relationship between perceived peer income and the probability of owning loans nor the conditional amount of these loans.

Of the control variables, age was found to have a negative influence on the likelihood of having a loan. This means that the older someone gets, the less likely it is that one owns debt. The conditional amount of debt outstanding does not seem to be affected by age. Interestingly, gender has an influence on probability of having debt outstanding as well as the conditional amount. Being male is significantly related to household debt ownership as well as the conditional amount outstanding. Further, partners were negatively associated with the conditional amount of borrowings outstanding. Partners thus have lower conditional amount of household debt outstanding. Similarly, a poor health was found to have a significant negative effect on the conditional borrowings amount. This suggests that a poor health could indicate lower levels of household loans

**Regression table: total household loans**

Table 4: The left panel shows the OLS regression outputs for the probability of having household loans outstanding. The right panel shows the OLS regression outputs for the logarithm of total household loans under the condition that the outstanding amount of household loans > 0. Standard errors are corrected for heteroscedasticity and clustered at the household level. The interaction terms between IHS(perceived peer income) and a big five personality trait (representing the moderating effect) is indicated with "Mod." Corresponding significance levels are indicated by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

| | Pr(household loans>0) | | Log(household loans \| household loans>0) | |
|---|---|---|---|---|
| Variable | Coefficient | Standard error | Coefficient | Standard error |
| Constant | -6.845** | 2.818 | -18.58 | 17.46 |
| *Explanatory variables:* | | | | |
| IHS(perceived peer income) | 0.560** | 0.256 | 1.348 | 1.546 |
| Extraversion | 0.494 | 0.381 | -1.168 | 2.219 |
| Agreeableness | -0.234 | 0.492 | 2.174 | 2.910 |
| Conscientiousness | 0.735 | 0.511 | 1.646 | 2.798 |
| Neuroticism | 0.323 | 0.382 | 0.495 | 2.090 |
| Openness | 0.538 | 0.514 | 1.191 | 3.584 |
| Mod. extraversion | -0.044 | 0.034 | 0.096 | 0.196 |
| Mod. agreeableness | 0.022 | 0.045 | -0.189 | 0.257 |
| Mod. conscientiousness | -0.069 | 0.046 | -0.119 | 0.249 |
| Mod. neuroticism | -0.032 | 0.035 | -0.048 | 0.186 |
| Mod. openness to experience | -0.040 | 0.047 | -0.108 | 0.318 |
| *Control variables:* | | | | |
| Age | -0.003*** | 0.001 | 0.001 | 0.006 |
| Male | 0.175*** | 0.028 | 0.469*** | 0.168 |
| Partner | -0.043 | 0.032 | -0.318** | 0.156 |
| Number of children | -0.000 | 0.016 | 0.086 | 0.078 |
| High school degree | 0.041 | 0.078 | -0.059 | 0.618 |
| College degree | 0.086 | 0.077 | 0.198 | 0.614 |
| Employed | 0.012 | 0.041 | 0.348 | 0.273 |
| Self-employed | -0.054 | 0.068 | 0.142 | 0.466 |
| Retired | 0.017 | 0.046 | 0.250 | 0.268 |
| Unemployed | -0.037 | 0.077 | 0.502 | 0.394 |
| Health: fair | -0.014 | 0.032 | -0.028 | 0.178 |
| Health: poor | -0.138 | 0.129 | -0.997*** | 0.369 |
| IHS(net household income) | 0.087*** | 0.029 | 1.165*** | 0.187 |
| Observations | 1,491 | | 722 | |
| R-squared | 0.091 | | 0.224 | |

outstanding. Lastly, a household's own net income was positively related to both the probability of owning as well as the amount of household loans.

The results of the regression analysis imply, contradictory to what was expected, that the big five personality traits do not have a moderating effect on the relationship between perceived peer income and household borrowings. To further investigate this implication, the first regression analyses are repeated separately for collaterized loans and consumer loans. It may be possible that the big five personality traits do have a moderating effect when examining perceived peer income and collaterized loans, or perceived peer income and consumer loans. In order to obtain these two debt groups, the total household loans are separated as follows. Collaterized loans consist of debts on hire-purchase contracts, debts based on payment by installment, debts with mail-order firms, shops or other retail business and mortgages on the main house, second house and other pieces of real estate. Consumer loans consist of private loans, extended lines of credit (unrelated to home equity), study loans, credit card debts, checking account deficits and other loans.

**Regression results: collaterized loans**

Table 5 presents the regression outcomes for collaterized loans. The regression results show that perceived peer income was significantly positively related to the likelihood of having collaterized debt outstanding. Individuals whom perceive their peers as having more income are thus more inclined to incur collaterized debt. This is in line with hypothesis 1 for collaterized debt. As was the case when looking at the conditional amount of total debt outstanding, the conditional amount of collaterized debt outstanding is not sensitive to differences in perceived peer income.

Both the conscientiousness and neuroticism personality traits were positively related to the probability of having collaterized debt outstanding. As anticipated, conscientiousness negatively moderated the association between perceived peer income and the probability of having collaterized debt. This confirms hypothesis 4 for collaterized loans. Notably, neuroticism had a negative moderating effect on the relationship between perceived peer income and the likelihood of holding collaterized debt. This contradicts the expectations denoted in hypothesis 5, regarding collaterized loans.

Turning to the control variables, age has a positive effect on the likelihood of having debt outstanding, but a negative effect on the conditional amount. Similar to our results for household loans in general, being male has a positive effect on the probability of owning collaterized loans outstanding. No significant effect of gender however, was

**Regression table: collaterized loans**

Table 5: The left panel shows the OLS regression outputs for the probability of having collaterized loans outstanding. The right panel shows the OLS regression outputs for the logarithm of collaterized loans under the condition that the outstanding amount of consumer debt > 0. Standard errors are corrected for heteroscedasticity and clustered at the household level. The interaction terms between IHS(perceived peer income) and a big five personality trait (representing the moderating effect) is indicated with "Mod." Corresponding significance levels are indicated by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

| Variable | Pr(collaterized loans>0) | | Log (collaterized loans \| collaterized loans >0) | |
|---|---|---|---|---|
| | Coefficient | Standard error | Coefficient | Standard error |
| Constant | -6.467*** | 2.155 | -11.38 | 14.44 |
| *Explanatory variables:* | | | | |
| IHS(perceived peer income) | 0.437** | 0.200 | 1.419 | 1.215 |
| Extraversion | 0.174 | 0.291 | 3.960 | 2.748 |
| Agreeableness | 0.043 | 0.390 | 3.705 | 3.369 |
| Conscientiousness | 0.823** | 0.403 | -1.513 | 2.871 |
| Neuroticism | 0.622** | 0.303 | 0.695 | 2.044 |
| Openness | -0.263 | 0.431 | -1.586 | 3.297 |
| Mod. extraversion | -0.016 | 0.027 | -0.351 | 0.242 |
| Mod. agreeableness | -0.004 | 0.035 | -0.323 | 0.297 |
| Mod. conscientiousness | -0.075** | 0.037 | 0.148 | 0.255 |
| Mod. neuroticism | -0.060** | 0.028 | -0.053 | 0.181 |
| Mod. openness to experience | 0.026 | 0.039 | 0.153 | 0.293 |
| *Control variables:* | | | | |
| Age | 0.002** | 0.001 | -0.016*** | 0.005 |
| Male | 0.145*** | 0.027 | 0.073 | 0.097 |
| Partner | -0.069** | 0.029 | 0.042 | 0.121 |
| Number of children | 0.023 | 0.015 | 0.070 | 0.044 |
| High school degree | 0.035 | 0.067 | -0.534** | 0.216 |
| College degree | 0.088 | 0.067 | -0.378* | 0.219 |
| Employed | 0.086** | 0.034 | 0.047 | 0.193 |
| Self-employed | 0.021 | 0.060 | 0.456 | 0.277 |
| Retired | 0.025 | 0.042 | 0.128 | 0.189 |
| Unemployed | 0.059 | 0.071 | 0.287 | 0.229 |
| Health: fair | -0.015 | 0.030 | -0.075 | 0.138 |
| Health: poor | -0.155 | 0.095 | -2.824*** | 0.234 |
| IHS(net household income) | 0.157*** | 0.023 | 0.584*** | 0.150 |
| Observations | 1,491 | | 559 | |
| R-squared | 0.134 | | 0.234 | |

shown on the conditional amount outstanding of this type of loan. Opposed to findings for total loans, there is a lower likelihood for couples to have collaterized loans outstanding. Further, possessing a high school or college degree tends to result in lower levels of collaterized debt, where observations with a high school degree show a relatively stronger negative relation regarding the conditional amount of debt outstanding. Further, employed individuals have a higher probability of incurring collaterized debt. Similarly to the results for total household loans, a poor health negatively influences the conditional amount of debt outstanding. Also in comparable are the findings for own household income, with a positive effect on both the probability of incurring collaterized loans as well as the conditional amount.

**Regression results: consumer loans**

The table 6 shows the findings of the regression analysis for consumer loans. The regression results reveal no relationship between perceived peer income and either the likelihood of consumer debt outstanding nor the conditional amount. Hypothesis 1 with respect to consumer debt is therefore not supported. Of the other explanatory variables, openness to experience has a marginal significant positive effect on the probability of having consumer debt as well as the conditional amount. Openness to experience was also found to have a marginally significant negative moderating effect on the relationship between perceived peer income and the amount of consumer debt outstanding. As the results concerning openness to experience show only a marginal significance, no conclusions can be drawn from this finding. For the other explanatory variables, no significant outcomes were revealed.

Considering the control variables, age had a negative effect on both the probability of holding consumer debt as well as the conditional outstanding amount. Similar results for gender regarding consumer loans are displayed compared to regression results of total household loans and collaterized loans. Being male has a positive influence on the conditional outstanding amount of consumer debt as well as the probability of possessing this type of debt. The number of children in a household also seemed to influence the amount of consumer debt held. Further, unemployment showed a negative influence on the likelihood of having consumer loans and on the conditional amount outstanding. Opposed to the findings of the regression analyses for total household debt and collaterized debt, a poor health does not influence consumer loans. Lastly, household's own net income has a negative effect on the probability of holding consumer debt.

**Regression table: consumer loans**

Table 6: The left panel shows the OLS regression outputs for the probability of having consumer loans outstanding. The right panel shows the OLS regression outputs for the logarithm of consumer loans under the condition that the outstanding amount of consumer debt > 0. Standard errors are corrected for heteroscedasticity and clustered at the household level. The interaction terms between IHS(perceived peer income) and a big five personality trait (representing the moderating effect) is indicated with "Mod." Corresponding significance levels are indicated by: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

| Variable | Pr(consumer loans>0) | | Log (consumer loans \| consumer loans>0) | |
|---|---|---|---|---|
| | Coefficient | Standard error | Coefficient | Standard error |
| Constant | -1.367 | 2.235 | 1.837 | 21.30 |
| *Explanatory variables:* | | | | |
| IHS(perceived peer income) | 0.182 | 0.201 | -0.056 | 1.968 |
| Extraversion | 0.570 | 0.350 | -2.604 | 3.239 |
| Agreeableness | -0.569 | 0.401 | -3.914 | 3.314 |
| Conscientiousness | 0.040 | 0.401 | 1.592 | 3.062 |
| Neuroticism | -0.057 | 0.320 | -3.078 | 2.750 |
| Openness | 0.720* | 0.423 | 8.512* | 4.653 |
| Mod. extraversion | -0.050 | 0.032 | 0.232 | 0.294 |
| Mod. agreeableness | 0.052 | 0.036 | 0.414 | 0.303 |
| Mod. conscientiousness | -0.006 | 0.036 | -0.151 | 0.278 |
| Mod. neuroticism | 0.006 | 0.029 | 0.309 | 0.248 |
| Mod. openness to experience | -0.056 | 0.038 | -0.756* | 0.424 |
| *Control variables:* | | | | |
| Age | -0.006*** | 0.001 | -0.046*** | 0.012 |
| Male | 0.061*** | 0.020 | 0.760*** | 0.263 |
| Partner | 0.003 | 0.025 | 0.067 | 0.273 |
| Number of children | -0.015 | 0.014 | -0.300** | 0.120 |
| High school degree | 0.007 | 0.065 | 0.515 | 0.525 |
| College degree | 0.007 | 0.065 | 0.568 | 0.524 |
| Employed | -0.048 | 0.033 | 0.191 | 0.354 |
| Self-employed | -0.060 | 0.055 | -0.635 | 0.610 |
| Retired | -0.027 | 0.032 | 0.786 | 0.608 |
| Unemployed | -0.122** | 0.051 | -1.442* | 0.797 |
| Health: fair | 0.012 | 0.026 | 0.183 | 0.305 |
| Health: poor | 0.075 | 0.118 | 0.666 | 0.571 |
| IHS(net household income) | -0.044* | 0.025 | 0.426 | 0.275 |
| Observations | 1,491 | | 257 | |
| R-squared | 0.097 | | 0.215 | |

**Robustness**

For all total household loans, total collaterized loans and total consumer loans, a regression analysis was performed with a categorical dependent variable that indicated the ownership of a loan ($y_i = 1$) or not ($y_i = 0$). According to Brooks (2014), an Ordinary Least Squares analysis is strictly not most appropriate estimation method in case the dependent variable is a categorical variable. As recommended by Brooks (2014), a probit analyses was performed in addition to the regression analyses presented above. The results of this probit analyses for each total household loans, total collaterized loans and total consumer loans are presented in appendix B. The probit analysis showed similar results in terms of significance with regard to total household loans and consumer loans. When considering the likelihood of owning collaterized, changes in significance were observed for perceived peer income, neuroticism and the moderating effect of neuroticism.

## 5. DISCUSSION AND CONCLUSION

**Summary of results**

This paper examined the moderating effect of the big five personality traits on the relationship between perceived peer income and household loans. In this setting, the likelihood of owning loans as well as the conditional amounts outstanding were considered for 2,154 observations, obtained from the Dutch National Bank Household Survey (DNBHS). Perceived peer income positively affects the likelihood of having household loans. The Big Five personality traits did not moderate this relationship. Separately analyzing collaterized loans and consumer loans yielded the following results. Neuroticism and conscientiousness negatively moderate the relation between perceived peer income and the likelihood of having collaterized debt. A marginal significant effect was found for openness to experience on the association between perceived peer income and the amount of consumer debt outstanding.

**Theoretical implications**

In line with the longitudinal study of Georgarakos, Haliassos and Passini (2014) from 2001 to 2008, this paper found that perceived peer income has a positive influence on the likelihood of owning collaterized loans. It should be noted that the result from the present paper is less pronounced in terms of significance compared to their study, respectively $p < 0.05$ versus $p < 0.01$. Contrastingly, this study did not found perceived peer income to be related to the conditional amount of collaterized loans outstanding. In addition, perceived peer income did not influence the probability of having consumer loans nor did it influence

the conditional outstanding amount. In their study, Georgarakos, Haliassos and Passini (2014) showed that the effect of perceived peer income on the likelihood of owning consumer loans and the conditional amount was less defined in both significance and effect compared to ceteris paribus collaterized loans. The results of the present study reflect this pattern to the extent where the findings for consumer loans are no longer significant. This opens debate on what could have been the cause of this change.

The run-up to the global financial crisis of 2008 could be a possible explanation for the perceived differences in findings of the present research and that of Georgarakos, Haliassos and Passini (2014). Ragnarsdóttir, Bernburg and Ólafsdóttir (2013) investigated the global financial crisis, individual distress and the role that subjective comparisons have. Based on the analysis of a national survey in Iceland which was collected during the economic crisis, they suggest that an economic crisis fosters social comparisons in three ways. Firstly, peoples' past financial situations (before the crisis) determine their expectations and wants, which are more difficult to fulfill during a financial crisis. Secondly, people evaluate whether the financial crisis harmed their income more compared to the income others. This often results in a negative view on one's own financial situation because, as explained in the literature review, individuals usually make upward social comparisons. Thirdly and lastly, people make estimates for their expected future financial situation. Anxiety about an individual's own future financial prospects with no signs of short-term improvement creates a lower acceptance of the current financial situation. The outcome of these three factors is twofold. Not only will these factors cause a direct increase in the frequency of social comparisons among individuals, they also have a negative influence on how people view their own income compared to that of others in their social circle. Although income comparisons between individuals will always be present to a certain extent, they are thus anticipated to be stronger during a financial crisis. Accordingly, the outcomes of these comparisons will also more defined during a crises. This could account for the fact that the effect of perceived peer income on collaterized debt and consumer debt is less pronounced in the present study compared to the existing study of Georgarakos, Haliassos and Passini (2014).

Interesting results were observed for the conscientiousness and neuroticism personality traits. The direct relation between conscientiousness and collaterized loans is negative. If individuals scored higher on conscientiousness, they had a higher probability of owning collaterized loans. This may be related to the fact that collaterized loans are

mainly linked to owning a house. Buying a house is usually subject to considerable financial planning, which is something conscientious individuals are especially capable of. The negative moderating effect of conscientiousness on the relationship between perceived peer income and the likelihood of owning collaterized debt, is in line with the expectations. This means that the positive relationship between perceived peer income and the probability of owning collaterized debt becomes less defined if an individual has a conscientious personality. This findings support the reasoning of previous research (Donnelly, Iyer and Howell, 2012). More conscientious individuals may thus indeed be less sensitive to perceived peer income concerns and have higher financial self-control. This allows such individuals to make better informed financial decisions and plan those decisions better, by for example saving prior to making an investment. These factors lower the probability of incurring a collaterized loan.

The direct relationship between neuroticism and collaterized loans is positive. This suggests that more neurotic individuals are indeed sensitive for impulsive consumption and not very well capable of delaying gratification, which reduces their capacity to save. As a consequence, highly neurotic individuals turn to borrowing. The negative moderating effect of neuroticism on the association between perceived peer income and the probability of holding collaterized debt is not as anticipated. This findings implies that the positive relationship between perceived peer income and the probability of owning collaterized debt becomes less pronounced when an individual has a neurotic personality. Friehe, Mechtel and Pannenberg (2017) suggested that increased income concerns regarding perceived income concerns exist among neurotic individuals. The effect in the context of borrowings is remarkable as more neurotic individuals are expected to be more concerned about perceived peer incomes, but this appears to make them less likely to incur collaterized loans. It should be noted here that this finding did not hold when using a probit estimation which is considered to be a more appropriate measure in this context. This may account for this notable finding.

**Practical implications**

Now, how can the results of the present study be put into practice? The present study increased our understanding and awareness of what drives us to incur borrowings. More specifically, the perceived income of members from our circle of acquaintances influences our borrowing behavior and our personality can influence this effect. As mentioned in the introduction, concerns of economic sustainability are raised as the debt of Dutch

households shows an increasing trend. Therefore, it could be desirable to decrease household debt levels across households in the Netherlands. This could be achieved by debt reduction programs. The present study's results can contribute to a behavioral approach for reducing household debt. Tests with behavioral approaches aimed at debt reduction have been conducted, such as for example the Borrow Less Tomorrow (BoLT) pilot program which is described in the paper of Karlan and Zinman (2012). This program combines decision assistance, reminders and social commitment in order to stimulate debt repayment. They also experimented with peer support and reported positive effects on the reduction of household borrowings. This peer support was expressed in the ability of peers to send notifications in case individuals fell behind his or her debt repayment schedules. The present study recommends and stresses the importance of using peer support in these debt reducing initiatives. Drawing from the literature review, I recommend picking coworkers or individuals as peer supporters to achieve the best effects. Furthermore, the indicated effect for personality could be put into practice in the further optimization of this process. An example of improvement could be the frequency of reminders. Neurotic individuals for example, may need more reminders than conscientious individuals because individuals with a neurotic personality trait are less able to delay gratification.

**Limitations and future directions**

One might argue that the estimated effects of the present study lack longitudinal research. As opposed to Georgarakos, Haliassos and Passini (2014) whose investigations were based on data from 2001 to 2008, the conclusions of the current research are based on a single observation from 2017. One of the research objectives was to examine the outcomes of their research in a new economic perspective. Because the results of a financial crisis can be felt for years, data was collected long after the financial crisis. The most recent available data that is published by the Dutch National Bank Household Survey (DNBHS) data at the time is writing is the survey of 2017. Furthermore, personality traits seem to be quite stable over time according to a longitudinal study by Cobb-Clark and Schurer (2011). Their study examined and confirmed the stability of personality traits among 7600 Australian individuals within the age of 25 to 30 over time-frame of four years. I therefore expect no different outcomes in case this study is repeated for a longer time frame.

Another possible critic to the findings of this study can concern the measurement of perceived peer income. Respondents were asked a set of questions with regard to those with whom they associate frequently. One question was included in which respondents

were asked to estimate the income of individuals from this group. This manner of collecting information about perceived peer income seems to be subjective and possibly inaccurate. However, the perceived income difference between individuals and that of their social circle is narrowly related to the actual difference in income according to Guven and Sørensen (2012). Furthermore, this approach circumvents the more subjective approach of identifying an individual's reference group manually, for example by education, social status or geographic location.

One aspect that present study fails to capture is the possibility that cultural differences could possibly affect the relationship between perceived peer income and household borrowings. Although personality traits are relatively stable over time, they may differ across different countries. A cross-country study on the geographic distribution of the big five personality traits across 54 countries by Schmitt *et al.* (2007) revealed that personality traits different across countries. Interestingly, Schmitt *et al.* (2007) also indicated that they are predictable to culture level indicators, such as for example with Hofstede's (2003) cultural dimensions. One of Hofstede's (2003) cultural dimensions is masculinity-femininity. My regression results indicated an effect of gender on the probability of holding as well as on the conditional amount collaterized and consumer loans. One characteristic of a more masculine culture is that such a culture is driven by competitiveness. It is plausible that a masculine country is therefore more engaged in perceived peer income comparisons compared to a country that scores high on femininity. As the current study is performed with household data from the Netherlands, a relatively feminine country (Kolman *et al.,* 2003), it could be interesting to investigate a more masculine country such as the United States. Future research could thus repeat the present study by using American household data and subsequently comparing the results to the outcomes of the present study.

**Conclusion**

To conclude, conscientiousness en neuroticism negatively moderate the positive relationship between perceived peer income and collaterized loans. My findings can contribute to the optimization of behavioral approaches to debt reduction, which could potentially decrease loans across Dutch households.

**Acknowledgement**

# REFERENCES

Barba, A., Pivetti, M., 2008. Rising household debt: its causes and macroeconomic implications - a long-period analysis. Cambridge Journal of Economics, 33(1), 113-137.

Basu, K., 1989. A theory of association: social status, prices and markets. Oxford Economic Papers, vol. 41, pp. 653–71.

Borghans, L., Duckworth, A. L., Heckman, J. J., Ter Weel, B., 2008. The economics and psychology of personality traits. Journal of human Resources, 43(4), 972-1059.

Bricker, J., Ramcharan, R., Krimmel, J., 2014. Signaling status: The impact of relative income on household consumption and financial decisions.

Brooks, C. 2014. Introductory econometrics for finance. Cambridge university press.

Brown, S., Taylor, K., 2014. Household finances and the Big Five personality traits. Journal of Economic Psychology, 45, 197-212.

Caporale, G.M., Georgellis, Y., Tsitsianis, N., Yin, Y.P., 2009. Income and happiness across Europe: do reference values matter? Journal of Economic Psychology, 30(1), 42-51.

CBS, 2018. Financial balance sheets and transactions by sectors; National Accounts. Statistics Netherlands, Den Haag/Heerlen. Available at: https://www.cbs.nl/en-gb/news/2017/38/household-debt-slightly-up [Accessed on 28-05-2018]

Cheung, F., Lucas, R. E., 2016. Income inequality is associated with stronger social comparison effects: the effect of relative income on life satisfaction. Journal of personality and social psychology, 110(2), 332.

Cobb-Clark, D. A., Schurer, S., 2012. The stability of big-five personality traits. Economics Letters, 115(1), 11-15.

Costa, P. T., McCrae, R. R., 1992. Neo Personality Inventory-Revised (NEO PI-R). Odessa, FL: Psychological Assessment Resources.

Donnelly, G., Iyer, R., Howell, R. T., 2012. The Big Five personality traits, material values, and financial well-being of self-described money managers. Journal of Economic Psychology, 33(6), 1129-1142.

Duesenberry, J. S., 1949. Income, saving, and the theory of consumer behavior.

Festinger, L., 1954. "A theory of social comparison processes," Human Relations, 7, 117-140.

Friehe, T., Mechtel, M., Pannenberg, M., 2017. Positional income concerns and personality: evidence from Germany. Applied Economics Letters, 1-5.

Gali, J., 1994. Keeping up with the Joneses: consumption externalities, portfolio choice, and asset prices. Journal of Money, Credit and Banking, 26(1), 1-8.

Georgarakos, D., Haliassos, M., Pasini, G., 2014. Household debt and social interactions. The Review of Financial Studies, 27(5), 1404-1433.

Goldberg, L. R., 1999. A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. Personality psychology in Europe, 7(1), 7-28.

Guven, C., Sørensen, B.E., 2012. Subjective well-being: keeping up with the perception of the Joneses. Social Indicators Research, 109(3), 439-469.

Harley, A., Wilhelm, M., 1992. Compulsive buying and exploration into self-esteem and money attitudes. Journal of Economics Psychology, 13, 5-17.

Heffetz, O., 2011. A test of conspicuous consumption: visibility and income elasticities. Review of Economics and Statistics, 93(4), 1101-1117.

Hofstede, G., 2003. Culture's consequences: Comparing values, behaviors, institutions and organizations across nations. Sage publications.

International Monetary Fund, 2017. Global financial stability report. GFSR | World economic and financial surveys.

Karlan, D.S., Zinman, J., 2012. Borrow less tomorrow: Behavioral approaches to debt reduction.

Kolman, L., Noorderhaven, N. G., Hofstede, G., Dienes, E., 2003. Cross-cultural differences in Central Europe. Journal of Managerial Psychology, 18(1), 76-88.

Likert, R., 1932. A technique for the measurement of attitudes. Archives of Psychology, 22(140): 1-55.

Lombardi, M. J., Mohanty, M. S., Shim, I., 2017. The real effects of household debt in the short and long run.

McCrae, R., Costa, P.T., 1997. ''Personality trait structure as a human universal'', American Psychologist, Vol. 52 No. 5, pp. 509-516.

Nyhus, E. K., Webley, P., 2001. The role of personality in household saving and borrowing behaviour. European journal of personality, 15(S1).

OECD, 2018. Household savings (indicator). Available at: https://www.cbs.nl/en-gb/news/2017/38/household-debt-slightly-up [Accessed on 28 May 2018]

Oshio, T., Nozaki, K., Kobayashi, M., 2011. Relative income and happiness in Asia: Evidence from nationwide surveys in China, Japan, and Korea. Social Indicators Research, 104(3), 351-367.

Ragnarsdóttir, B. H., Bernburg, J. G., Ólafsdóttir, S., 2013. The global financial crisis and individual distress: the role of subjective comparisons after the collapse of the Icelandic economy. Sociology, 47(4), 755-775.

Rayo, L., Becker, G. S., 2006. Peer comparisons and consumer debt. The University of Chicago Law Review, 73(1), 231-248.

Roberts, B.W., 2009. "Back to the Future: Personality and Assessment and Personality Development." Journal of Research in Personality 43(2): 137-145.

Schmidt, U., Neyse, L., Aleknonyte, M., 2015. Income inequality and risk taking (No. 2000). Kiel Working Paper.

Schmitt, D.P., Allik, J., McCrae, R.R., Benet-Martínez, V., 2007. The geographic distribution of Big Five personality traits: Patterns and profiles of human self-description across 56 nations. Journal of cross-cultural psychology, 38(2), 173-212.

Veblen, T. 1899. The theory of the leisure class. (Mentor books New York), 1953.

Wärneryd, K. E., 1996. Risk attitudes and risky behavior. Journal of economic psychology, 17(6), 749-770.

Yazdanparas, A., Alhenawi, Y., 2017. Personality and borrowing behavior: An examination of the role of need for material resources and need for arousal traits on household's borrowing decisions. Financial Services Review, 26(1).

## APPENDIX A. Big Five personality traits survey

Complete list of the 50 Big Five personality questions from the questionnaire, grouped by personality trait, along with their mean and standard deviation. Some questions required recoding, this is indicated in the "recode column".

| Survey question (grouped by personality trait) | Recode | Mean | SD |
|---|---|---|---|
| **Extraversion** | | | |
| I am the life of the party | No | 2.29 | 1.00 |
| I do not talk a lot | Yes | 3.35 | 1.03 |
| I feel comfortable around people | No | 3.65 | 0.86 |
| I keep in the background | Yes | 2.75 | 0.98 |
| I start conversations | No | 3.32 | 0.94 |
| I have little to say | Yes | 3.58 | 0.95 |
| I talk to a lot of different people at parties | No | 3.14 | 1.07 |
| I do not like to draw attention to myself | Yes | 2.63 | 1.09 |
| I do not mind being in the center of attention | No | 2.77 | 1.08 |
| I am quiet around strangers | Yes | 3.08 | 1.10 |
| **Agreeableness** | | | |
| I feel little concern for others | Yes | 3.98 | 1.01 |
| I am interested in people | No | 3.89 | 0.82 |
| I insult people | Yes | 4.36 | 0.85 |
| I sympathize with others' feelings | No | 3.93 | 0.82 |
| I am not interested in other people's problems | Yes | 3.80 | 0.97 |
| I have a soft heart | No | 4.08 | 0.70 |
| I am not really interested in others | Yes | 8.89 | 0.96 |
| I take time out for others | No | 3.79 | 0.78 |
| I feel others' emotions | No | 3.61 | 0.87 |
| I make people feel at ease | No | 3.66 | 0.79 |
| **Conscientiousness** | | | |
| I do chores right away | No | 3.09 | 0.95 |
| I'll leave my things lying around | Yes | 3.50 | 1.16 |
| I live my life according to schedules | No | 2.62 | 1.02 |
| I neglect my obligations | Yes | 4.08 | 0.92 |
| I pay attention to details | No | 3.76 | 0.88 |
| I am accurate at work | No | 4.03 | 0.79 |
| I forget to put things back where they belong | Yes | 3.76 | 1.09 |
| I am always well prepared | No | 3.46 | 0.82 |
| I often make a mess of things | Yes | 4.15 | 0.84 |
| I like order | No | 3.95 | 0.89 |

**Neuroticism**

| | | | |
|---|---|---|---|
| I get stressed out easily | No | 2.39 | 1.09 |
| I am relaxed most of the time | Yes | 2.40 | 0.85 |
| I worry about things | No | 3.24 | 0.95 |
| I seldom feel blue | Yes | 2.40 | 0.85 |
| I am easily disturbed | No | 2.80 | 1.00 |
| I get upset easily | No | 2.30 | 1.00 |
| I change my mood a lot | No | 2.15 | 1.00 |
| I have frequent mood swings | No | 2.23 | 1.12 |
| I get irritated easily | No | 2.38 | 0.96 |
| I often feel bleu | No | 2.01 | 0.98 |

**Openness to experience**

| | | | |
|---|---|---|---|
| I have a rich vocabulary | No | 3.64 | 0.91 |
| I have difficulty understanding abstract ideas | No | 2.52 | 1.03 |
| I have a vivid imagination | No | 3.23 | 1.10 |
| I am not interested in abstract ideas | Yes | 3.37 | 1.03 |
| I have excellent ideas | No | 3.43 | 0.87 |
| I do not have a good imagination | Yes | 3.60 | 1.06 |
| I am quick to understand things | No | 3.86 | 0.80 |
| I use difficult words | No | 2.70 | 1.07 |
| I spend time reflecting on things | No | 3.66 | 0.81 |
| I am full of ideas | No | 3.07 | 1.03 |

## APPENDIX B. Probit regression output

The left panel shows the probit regression outputs for the probability of having household loans outstanding. The middle panel presents the probit regression outputs for the probability of having collaterized loans outstanding. The right panel shows the displays the probit regression outputs for the probability of having consumer loans outstanding. Standard errors are corrected for heteroscedasticity and clustered at the household level. The interaction terms between IHS(perceived peer income) and a big five personality trait (representing the moderating effect) is indicated with "Mod." Corresponding significance levels are indicated by: *** p < 0.01, ** p < 0.05, * p <0.1.

| Variable | Pr(total household loans>0) | | Pr(collaterized loans>0) | | Pr(consumer loans>0) | |
|---|---|---|---|---|---|---|
| | Coefficient | Standard error | Coefficient | Standard error | Coefficient | Standard error |
| Constant | -20.73** | 8.108 | -19.30* | 10.21 | -9.024 | 9.000 |
| *Explanatory variables:* | | | | | | |
| IHS(perc. peer income) | 1.591** | 0.733 | 1.069 | 0.918 | 0.874 | 0.810 |
| Extraversion | 1.269 | 1.085 | 0.057 | 1.239 | 2.071 | 1.342 |
| Agreeableness | -0.708 | 1.411 | -0.270 | 1.631 | -2.290 | 1.625 |
| Conscientiousness | 2.066 | 1.440 | 3.823** | 1.732 | 0.416 | 1.518 |
| Neuroticism | 0.819 | 1.054 | 0.847 | 1.338 | -0.052 | 1.203 |
| Openness | 1.807 | 1.563 | -1.530 | 1.828 | 2.965 | 1.972 |
| Mod. extraversion | -0.113 | 0.098 | -0.008 | 0.111 | -0.179 | 0.120 |
| Mod. agreeableness | 0.067 | 0.127 | 0.026 | 0.146 | 0.208 | 0.146 |
| Mod. conscientiousness | -0.194 | 0.130 | -0.342** | 0.155 | -0.050 | 0.136 |
| Mod. neuroticism | -0.081 | 0.095 | -0.087 | 0.120 | 0.009 | 0.108 |
| Mod. Openness to exp. | -0.140 | 0.141 | 0.142 | 0.164 | -0.229 | 0.177 |
| *Control variables:* | | | | | | |
| Age | -0.009*** | 0.003 | 0.011*** | 0.003 | -0.022*** | 0.004 |
| Male | 0.463*** | 0.075 | 0.404*** | 0.080 | 0.252*** | 0.087 |
| Partner | -0.121 | 0.085 | -0.222** | 0.088 | 0.015 | 0.103 |
| Number of children | 0.001 | 0.042 | 0.067 | 0.043 | -0.042 | 0.053 |
| High school degree | 0.135 | 0.239 | 0.157 | 0.238 | 0.056 | 0.392 |
| College degree | 0.253 | 0.237 | 0.320 | 0.238 | 0.088 | 0.387 |
| Employed | 0.030 | 0.111 | 0.366*** | 0.122 | -0.129 | 0.126 |
| Self-employed | -0.151 | 0.183 | 0.168 | 0.197 | -0.184 | 0.214 |
| Retired | 0.045 | 0.128 | 0.116 | 0.138 | -0.143 | 0.164 |
| Unemployed | -0.110 | 0.212 | 0.278 | 0.233 | -0.526** | 0.266 |
| Health: fair | -0.039 | 0.086 | -0.023 | 0.091 | 0.069 | 0.109 |
| Health: poor | -0.410 | 0.411 | -0.561 | 0.586 | 0.343 | 0.390 |
| IHS(net hh income) | 0.234*** | 0.080 | 0.539*** | 0.082 | -0.180* | 0.096 |
| Observations | 0.068 | | 0.118 | | 0.105 | |
| R-squared | 1,491 | | 1,491 | | 1,491 | |