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The influence of parental financial teaching on saving and borrowing behavior

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Abstract

This paper uses the household survey of De Nederlandsche Bank to investigate whether parental financial teaching influences the saving and borrowing behavior of individuals. The findings are that parental financial teaching leads to more saving and less borrowing. In addition, the study shows that this teaching most affects saving behavior when parents provide it throughout the childhood period. It also indicates that modeling, guidance and discussion, and habit formation mechanisms explain the influence parents have on the formation of their children's saving and borrowing behavior.

Keywords: household financial decision making, parental financial teaching, borrowing, saving

JEL classifications: A290, D120, D140, D830, J130

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1. Introduction

Households nowadays have more responsibilities in relation to financial issues; in addition, they also have to make an increasing number of decisions on their own. For instance, government policies have made pensions subject to less government regulation and more the responsibility of individuals. Households also have easier access to financial markets and increasing possibilities for obtaining credit. However, the exposure to risk has grown as a result of changes to the rules for and terms of borrowing money in recent years (Lusardi and Mitchell, 2014). These changes in the financial environment have led to financial decision making becoming an active topic for households, which must now decide everything from how much money to put aside in the following year to whether to take out loans.

Recent studies have shown that households struggle to make responsible financial decisions and therefore display suboptimal behavior. For instance, households fail to put enough money aside for retirement (Lusardi and Mitchell, 2007b), four out of ten households in the Netherlands have insufficient funds to deal with financial setbacks (Boonen, 2015). Households in the United States have, on average, €7,500 of uncollateralized debt (Benton, Meier and Sprenger, 2007).

A major reason why households make suboptimal financial decisions is that they have a limited degree of financial literacy. Lusardi and Mitchell (2014) describe financial literacy as “peoples’ ability to process economic information and make informed decisions about financial planning, wealth accumulation, debt, and pensions.” Financial illiteracy leads to lower savings and more borrowing (Alessie, van Rooij and Lusardi, 2011). Increasing the financial literacy of households is therefore a solution to the problem of suboptimal behavior.

One of the factors that may positively influence financial literacy levels is financial education (Bucks and Pence, 2006; Batty, Collins and Odders-White, 2015). Studies that have looked at topics ranging from financial education at high school levels (Bernheim, Garrett and Maki, 2000) to the effects of financial education in the workplace (Bayer, Bernheim and Scholz, 2009) conclude that financial education leads to changes in financial behavior. However, the effect of financial education by parents has not been widely studied, despite that several studies indicate that the financial behavior that is formed in childhood, which likely partly stems from one’s parents, persists into adulthood (Shim, Barber, Card, Xiao and Serido, 2010). This study therefore investigates the role of parents in the formation of their children’s saving and borrowing behavior.

Although this study is not the first to look at the effect of parental financial teaching on saving and borrowing behavior, the understanding of this effect is still in its infancy. This research also constitutes a valuable contribution to existing research as it investigates the mechanisms behind parental influence on children's future saving and borrowing behavior and consequently better explains parents' role in the process. Additionally, this study reports whether the age at which children learn about financials from their parents makes a difference and clarifies at which age the formation of individual saving and borrowing behavior is most affected by parents. It also examines the long-term effects of receiving parental financial teaching, which is a first in relation to borrowing behavior (given that previous studies have only observed the effect on young adults). The findings of this research are therefore more representative in terms of explaining the actual saving and borrowing behavior of adults.

This research explores saving and borrowing behavior, since saving and borrowing decisions are the most important financial decisions that people make. Consumers save and borrow to have enough money left for retirement, to make stable and expensive purchases and to protect themselves against unforeseen expenses (Buccioli and Veronesi, 2014). Although these motives are positive, borrowing money also has adverse effects, given that over-borrowing can put households into financial difficulties. It is therefore useful to research whether parental financial teaching can lead to specific consumer saving and borrowing behavior. As such, the research question of this study is as follows:

Does parental financial teaching in childhood influence individual saving and borrowing behavior?

Answering this question reveals whether the "financial education" method that parents use with their children influences the saving and borrowing behavior of consumers. I do so using panel data from the De Nederlandsche Bank (DNB) household survey (DHS) that includes information obtained during annual interviews with Dutch households on matters pertaining to household finances.

My empirical analysis produces several results. First, I find that financial parental teaching leads to 2% more willingness to save and 1% fewer loans. Second, I discover that it also leads to more savings and lower debts. Third, my results show that providing parental financial teaching over a long period in childhood influences saving behavior most significantly. Fourth, I find that modeling, guidance and discussion, and habit formation mechanisms explain parental effects on children's future saving and borrowing behavior.

This study is relevant for both policy makers and academics. Policy makers want individuals to make good financial decisions, and this research reveals how parents influence this achievement. The relevance for academics is twofold: first, this research links to previous studies on the impact of financial education on saving and borrowing behavior. Second, to my knowledge it is one of the first studies to observe different mechanisms in order to explain the effect of parental financial teaching on the saving and borrowing behavior of adults. This research is therefore a valuable addition to the existing literature.

This paper is organized as follows: section two provides an overview of previous studies on this topic; section three contains a description of the data and the methodology; section four outlines the main empirical findings; and finally, section five presents conclusions and discusses the research.

2. Parental financial teaching: Theoretical background and hypothesis setting

This section provides the theoretical background on parental financial teaching and individuals' saving and borrowing behavior. A literature review has been performed to formulate the hypotheses.

2.1. The influence of parents

Many previous studies have discussed the role that financial education plays in relation to financial behavior and whether financial education is relevant to increasing financial knowledge (Bucks and Pence, 2006; Batty et al., 2015). However, it is difficult to make education that is suitable for everyone (Willis, 2011; Lusardi and Mitchell, 2014), as some people have more basic knowledge about financials than others. Consequently, financial education in schools or at the workplace is not the most significant factor that affects the saving and borrowing behavior of adults. In line with this, Shim et al. (2010) argue that the role that parents play in predicting young adult behavior is substantially greater than the role played by work experience and high school financial education, since the financial behavior formed in childhood persists into adulthood. Additionally, social and familial influences result in particular financial behavior before children are formally educated (Batty et al., 2015). It is therefore likely that parental financial teaching is more appropriate and effective than general financial education. Vassallo (2003) supports this view by stating that parents are the most

important socialization agents. The theory of planned behavior and the family systems theory both support the view that parents play a role in forming the financial behavior of their children; these theories are further explored below.

First, the theory of planned behavior states that an individual's behavior is influenced by behavioral intentions that are formed by attitudes, subjective norms and perceived control (Ajzen, 1991). Parents influence children's attitude towards particular behaviors, since children are likely to copy some of their parents' behaviors. In addition, children feel pressure from their parents to behave in a certain way (e.g. not to spend much money on candy). Finally, parents influence perceived control, since they can control their children's expenditures (e.g. by prohibiting certain purchases). This theory therefore asserts that parents influence their children's behavioral intentions. According to Ajzen (1991), the stronger the intention to engage in a behavior, the more likely it is that they behavior will be exhibited. It is correspondingly expected that parents influence the saving and borrowing behavior of their children.

Second, the family systems theory also suggests that parents influence the behavior of their children. The theory is derived from Bertalanffy's (1968) systems theory, which states that the behaviors of people in the same group (system) are correlated with each other. In relation to families, this means that the individual actions of family members affect the behavior of the whole family (Moore and Asay, 2013). The family systems theory consequently supports the assertion that parents' actions (e.g. monitoring expenditure or giving advice) influence the behavior of their children.

Previous studies thus reveal that a relationship between parents and the future saving and borrowing behavior of children does exist. Furthermore, Buccioli and Veronesi (2014) find that parental financial teaching increases an individual's willingness to save by 16% and their saving amounts by about 30%, while Norvilitis and MacLean (2010) find that parents influence the borrowing behavior of adults. The first hypothesis is therefore as follows:

Hypothesis 1a: Receiving parental financial teaching influences the saving behavior of adults.

Hypothesis 1b: Receiving parental financing teaching influences the borrowing behavior of adults.

2.2. The influence of prolonged education

According to Bayer et al. (2009), the greatest effect on financial behavior is achieved by receiving financial education as often as possible. They find that for employees, attending more seminars leads to better financial behavior. When their findings are connected with this study, it can be expected that receiving more parental financial teaching in life leads to major changes in saving and borrowing behavior. Parents can teach their children about financial behavior at different ages: parental financial teaching can begin in early childhood and continue through adolescence. Not much research has been done on the ages at which children can best receive parental financial teaching; however, it is likely that prolonged financial education is the best, since children have more frequent contact with the advantages of parental financial teaching, which leads to a more persistent effect. Moreover, some financial issues are too hard to discuss at a young age and should be deferred to later. However, starting financial teaching too late can mean that unwanted habits have already been formed. Providing parental financial teaching throughout childhood should therefore lead to the best results. This is in line with the findings of Bucciol and Veronesi (2014), who suggest that the most effective way to influence individuals' saving behavior is to teach them during both childhood and adolescence. The second hypothesis is therefore as follows:

Hypothesis 2a: Receiving parental financial teaching during both childhood and adolescence has the largest impact on the saving behavior of adults.

Hypothesis 2b: Receiving parental financial teaching during both childhood and adolescence has the largest impact on the borrowing behavior of adults.

2.3. An overview of different mechanisms

As stated in the introduction, another interesting issue to explore is how parents influence the saving and borrowing behavior of their children. To do so I test four mechanisms introduced by Webley and Nyhus (2006), namely modeling, discussion and guidance, habit formation, and independence.

The first mechanism is modeling. In general, parents are the first models observed by children; children imitate their behavior or compare it with their own. This is in line with the findings of Webley and Nyhus (2006), who discovered that the approach of children to

economic matters is linked to that of their parents. It is consequently expected that when children observe particular behavior in their parents (e.g. the careful use of money), they will copy it; it is also possible that they show contrarian behavior, since some children turn away from their parents. Even in the latter case, however, as role models parents still do influence their children's future saving and borrowing behavior.

Discussion and guidance constitute the second mechanism that can explain the relation between parental financial teaching and adult financial behavior. Related activities include explaining financial situations to children, discussing why certain financial decisions are made in households and providing advice about saving and borrowing. Children who discuss financial issues with their parents are stimulated to think about financial matters, which increases their financial awareness. In addition, Webley and Nyhus (2006) state that individuals whose parents discuss household economic decisions with them have both a better future orientation and an ability to control expenditure. The former should lead to higher savings (with a view to retirement), while the latter leads to both higher savings (as less expenditure means more money is left to save) and less over-borrowing (if consumers can better control their expenditures, fewer loans are need to cover expenses). Discussing financial matters with and providing guidance to children are therefore expected to influence saving and borrowing behavior. Previous studies support this view: Buccioli and Veronesi (2014) find that receiving advice from parents leads to both a higher propensity to save and higher saving amounts, while Norvilitis and MacLean (2010) find that teaching children how to manage their allowance and bank accounts leads to lower credit card debt levels in college.

The third mechanism is habit formation. As individuals' habits are formed at a young age, parents influence the development of their children's habits. According to Batty et al. (2015), schools cannot fill the role of parents in relation to personal finance habits. Parents' role in habit formation thus has a high impact. For instance, the way a source of income is managed is a habit that can be formed in childhood. Examples of habits are spending money immediately or saving it for the future. Parents influence the habit formation of their children by monitoring their spending patterns and pushing behavior in certain directions to prevent unwanted habits from being formed. As it is likely that behavior from childhood persists into adulthood, parents' role in the formation of their children's habits allows them to influence their saving and borrowing behavior as well.

Independence is the fourth mechanism that can explain the role of parents in forming the future behavior of children. Independence in this case means that children are not dependent on their parents in order to make some expenditures. One method for creating

independence is giving children an allowance, which makes children responsible for managing their own money. This teaches children to make their own decisions, which leads to experience in making financial decisions (Ashby, Schoon and Webley, 2011). In addition, Webley and Nyhus (2006) argue that having responsibility for financial decisions leads to learning economic skills. Since independence in making financial decisions in childhood increases both the experience in making financial decisions as well economic skills, it is expected to influence the future saving and borrowing behavior.

Beyond the four mechanisms of Webley and Nyhus (2006) described above, heritability also plays a role in the formation of saving and borrowing behavior. Cronqvist and Siegel (2015) find that 33% of the variation in savings behavior across individuals can be explained by genetic differences. In addition, Nyhus and Webley (2001) have observed that personal traits influence saving and borrowing behavior. Personal traits are inherited and therefore heritability can be one explanation as to why parents influence the future saving and borrowing behavior of their children. However, as the dataset used in this study does not cover heritability, the effect of heredity cannot be investigated.

Considering the four mechanisms discussed above, the third hypothesis is as follows:

Hypothesis 3a: Modeling, discussion and guidance, habit formation and independence are mechanisms that explain how parents influence the saving behavior of adults.

Hypothesis 3b: Modeling, discussion and guidance, habit formation and independence are mechanisms that explain how parents influence the borrowing behavior of adults.

3. Data and methodology

This section first provides an overview of the data source and sample selection method. Second, the different variables used in this study are described. Finally, the methodology is discussed.

3.1. Data selection

This study uses panel data from the DHS to test whether parental financial teaching influences the financial behavior of individuals. The survey has been conducted by

CenterERdata every year since 1993. The information is collected to explain the influences of economic and psychological factors on the financial behavior of Dutch households. According to Webley and Nyhus (2006), the sample is representative of the Dutch population.

The DHS data are collected by means of an Internet panel undertaken by CentERdata. People without connectivity participate through a TV set top box or using an obtained computer and internet connection. Each year, approximately 2,000 households participate in the survey. All persons over the age of sixteen in the household are invited to complete it. In order to deal with attrition, households in the dataset are replaced over the years (Teppa and Vis, 2012). The survey gathers information on participants' saving and borrowing behaviors and childhoods, as well as general information.

An advantage of the DHS is that it tracks the same individual over a number of years, which allows researchers to obtain a representative picture of respondents' financial behavior. Moreover, the influence of factors that fluctuate over the years is reduced.

This research considers surveys from the years 2000 to 2014. Surveys before 2000 are not included because, according Buccioli and Veronesi (2014), they were primarily completed by wealthier households. Furthermore, after 2000 the questionnaires are similar and the sampling design is the same (Buccioli and Veronesi, 2014). Consequently, the surveys from 2000 onwards are more comparable and the results are easier to interpret.

The original dataset retrieved from the DHS contained 69,168 observations. From this dataset, 18,838 observations are used in the final sample for this research. First, 40,725 observations are deleted because the respondent was not the head of the household. According to Nyhus and Webley (2001), the head of the household has the most influence on how much to save and to borrow. Moreover, only the person who pays the accounts responds to questions in the DHS about shared savings accounts and loans, and this person is often the head of the household; as such, only answers from heads of households are relevant. Second, in order to observe the influence of parental financial teaching on adults, seven observations from respondents younger than seventeen are not included in the study. Third, 8,834 observations are deleted from the original dataset because the respondents did not answer a question on parental financing teaching or respond to one of the dependent variables, which makes it impossible to investigate the influence of financial parental financial teaching on saving and borrowing behavior. A further 677 observations are deleted because the individuals only participated in the survey on one occasion; repeated observations from the same individuals are needed to produce better estimates for the time-varying characteristics of the respondents.

The questions about financial parental financial teaching relate to a respondent's past; as such, the responses given should be the same from year to year. However, this was not always the case. In order to obtain consistency, inconsistent answers are replaced with the prevailing answer of the respondent over the years. It is likely that the answer the respondent provides most commonly is the correct one. Respondents who do not have a prevailing answer are deleted.

After all of the above considerations are taken into account, the result is a final sample of 18,838 observations. These observations come from 2,754 individuals. Respondents are always the head of the household, so the 18,838 observations are from 2,754 unique households. The average number of observations per respondent is 7.3, which is sufficient to reveal patterns in respondents' saving and borrowing behaviors and investigate factors that might explain them.

Table I presents summary statistics for the pooled sample. The average age of respondents is 54 and approximately 25% of the individuals are retired. Men are over-represented in this research, since only 25% of the respondents are women. Slightly more than half of the respondents are employees. Seventy percent of the respondents save an average amount of €4,116 per year (which represents on average 13% of their net income). In comparison, 22% of the respondents have loans with an average debt shield of €3,449 (which is on average 9% of net income). Almost 85% of the respondents received parental financial teaching in both their young childhood and adolescence.

Table 1. Summary statistics - pooled sample

This table provides an overview of summary statistics of the pooled sample. *Saving behavior* refers to four variables which measure the saving behavior of individuals. *Debt behavior* refers to three variables which measure the debt behavior of individuals. *Parental teaching received in childhood* refers to the degree in which parental financial teaching is obtained in childhood. *Parental teaching only received in young childhood, parental teaching only received in adolescence and parental teaching received throughout childhood* are dummy variables equal to 1 if parental financial teaching is only received in the corresponding age category. *Presence of mechanisms in childhood* refers to four ordinal variables which indicate in which degree the different mechanisms were present in childhood. *Control variables* refers to socio-demographic characteristics of the respondents.

Variable	Range	Obs.	Mean	Std. Dev.
Saving behavior				
Willingness to save	0 - 1	17,273	0.70	0.46
Total savings per year (€)		16,637	4,116	7,328
Willingness to save in future	1 - 4	16,943	3.23	0.87
Savings to net income		11,607	0.13	0.71
Debt behavior				
Presence of a loan	0 - 1	16,500	0.22	0.42
Total debt (€)		12,747	3,449	33,914
Total debt to net income		8,987	0.09	1.61
Parental financial teaching				
Parental financial teaching received	4 - 17	17,019	11.16	2.55
Parental teaching only received in young childhood	0 - 1	18,420	0.13	0.33
Parental teaching only received in adolescence	0 - 1	18,420	0.01	0.10
Parental teaching received throughout childhood	0 - 1	18,420	0.83	0.37
Presence of mechanisms in childhood				
Modeling / received stimulation to save	1 - 4	18,150	2.67	1.05
Discussion and guidance / received financial advice	1 - 4	18,039	2.45	1.09
Habit formation / expenditures were monitored	1 - 5	18,022	3.44	1.36
Independence / received pocket money	1 - 4	18,443	2.58	1.36
Control variables				
Female	0 - 1	18,838	0.25	0.43
Age (in years)		18,837	54	14.92
Retired (age >65)	0 - 1	18,838	0.27	0.45
High education	0 - 1	17,301	0.44	0.50
Middle education	0 - 1	17,301	0.52	0.50
Low education	0 - 1	17,301	0.04	0.20
Employee	0 - 1	16,498	0.58	0.49
Self-employee	0 - 1	16,498	0.04	0.19
Participation in a partnership	0 - 1	16,498	0.01	0.07
No work	0 - 1	16,498	0.38	0.49
Risk attitude 1	1 - 7	15,900	4.96	1.37
Risk attitude 2	1 - 7	15,933	5.47	1.25
Number of children	0 - 6	18,838	0.59	1.01
Size of the household	1 - 8	18,838	2.27	1.24
Net income (€)		12,587	32,005	21,725

3.2. Construction of key variables

Below the independent, dependent and control variables used in this study are described successively.

3.2.1. Saving and borrowing behavior

The dependent variables in this research are the saving and borrowing behaviors of adults. Please refer to appendix A for an exact definition of all of the variables included.

Saving behavior is measured in four ways. First, as the willingness to save in a given year; second, as the total amount of savings in a given year; third, as the ratio of savings in a given year relative to net income; and fourth, as the propensity to save in the future. The willingness to save takes a value of one (yes) if the respondent's household put any money aside during the previous year; if not, it has the value of zero (no). This is in line with the studies of Webley and Nyhus (2012) and Bucciol and Veronesi (2014). The amount saved in the previous year is derived from a question with a discrete answer scale. I follow the approach of Bucciol and Veronesi (2014) and include this as a continuous variable. The continuous variable is set equal to the central value of each range. For the extreme ranges, the threshold value is used to create a continuous variable. In addition, the natural logarithm of the amount saved in a given year is included in the study in order to reduce the influence of outliers on its results. The amount of savings increases over time in line with inflation, which represents no real increase; it should therefore be corrected for inflation. The consumer price index for all items is used² to report savings at 2013 prices. The ratio of savings in a given year relative to net income is measured as the sum of total savings in a given year divided by net income of a given year. The propensity of individuals to save in the future is measured by the question: "*Is your household planning to put money aside in the next 12 months?*" The answer is included as an ordinal variable [1 = No, certainly not; 2 = No, probably not; 3 = Yes, perhaps; 4 = Yes, certainly]. These measurements of future saving behavior correspond with the studies of Nyhus and Webley (2001) and Webley and Nyhus (2012).

To test the borrowing behavior of households, eight types of loans are distinguished in this research: private loans; extended lines of credit; credits by mail-order companies; finance

² Source: Statistics Netherlands, the consumer price index can be found at <http://statline.cbs.nl/StatWeb/publication/?DM=SLNL&PA=71905NED&D1=a&D2=a&VW=T>

credit; loans from family, friends, or acquaintances; study loans; credit cards; and other loans. This is in line with the studies of Nyhus and Webley (2001) and Webley and Nyhus (2012).

Borrowing behavior is measured in three ways: first, as the presence of a loan; second, as the total sum of debt on different loans; and third, as the ratio of the total amount of debt relative to net income. The presence of a loan is included as a dummy variable in the study (0 = No; 1 = Yes). The variable takes a value of one if the respondent has one or more loans as described above, otherwise it has a value of zero. The total amount of debt is calculated as the sum of the debt on the different loans. The natural logarithm of the sum is taken to minimize the effect of outliers. As in the case of the saving amount, this variable is corrected for inflation. In addition, the total amount of debt for years before 2003 is converted to euro from guilder, which makes the variable comparable. The portion of debt that a person has relative to his or her net income is measured by the sum of the total amount of debt divided by net income.

3.2.2. Parental financial teaching

This study uses four questions from the DHS to observe whether an individual receives **parental financial teaching**. Please refer to appendix A for more information on these questions. In this research, the parental financial variable is the total sum of the ordinal answer scales for these four questions, which range from 4 to 17. For clarity, a high score on this variable means that the respondent received a great amount of financial education from his or her parents and the minimum score of 4 refers to an individual who has not received parental teaching in their childhood. This measurement was chosen given that more than 95% of the respondents have received some form of parental financial teaching. A dummy variable is therefore not suitable for detecting anything, since hardly any variance in that variable would be seen.

The four questions about the presence of parental financial teaching are also used to observe the effect of possible mechanisms that can explain parental influence on the future saving and borrowing behavior of children. First, being stimulated to save in childhood is used as a proxy for **modeling**. Although it does not directly measure the role of modeling by parents, it measures its indirect effects. I assume that parents stimulate their children to mimic their financial behavior by emphasizing that behavior; in other words, parents provide an example of how to behave in relation to financial issues. Coming into contact with this behavior makes it easier for children to copy it. Since this copying is an effect of modeling,

the stimulation of particular behavior is linked with parents as models. The following question is selected as the best option for measuring modeling using the DHS dataset: “*Did your (grand)parents stimulate you to save money between the ages of 12 and 16?*” The variables range from 1 to 4 [1 = No, not at all; 2 = Yes, but only to a certain extent; 3 = Yes, they told me how important saving is; 4 = Yes, they emphasized the necessity of saving].

Second, **discussion and guidance** are measured by looking at budget advice received from parents during childhood. The following question is used: “*Did your (grand)parents try to teach you how to budget when you were between 12 and 16 years of age?*” This variable also ranges from 1 to 4 [1 = No; 2 = Yes, but only to a certain extent; 3 = Yes, they gave me some advice and practical help; 4 = Yes, they gave me advice and practical help].

Third, parental monitoring is used as a proxy for **habit formation**. As mentioned in Section 2.3, monitoring expenditures is a method for parents to influence the formation of habits in their children. “*When you were between 8 and 12 years of age, could you spend your money as you pleased?*” is the question used. This variable ranges from 1 to 5 [1 = I could decide on all of my expenditures; 2 = I could mostly decide how I spent my money; 3 = Part of my expenditure was decided by me, the rest by my parents; 4 = My parents decided how I spent most of my money; 5 = My parents decided how I spent all of my money].

Lastly, receiving pocket money from parents is used as proxy for **independence**. As described in Section 2.3, giving an allowance is one way to make children financially independent and responsible. The following question is used: “*When you were between 8 and 12 years of age, did you receive an allowance from your parents? By allowance we mean a fixed amount received on a regular basis.*” The variables range from 1 to 4 [1 = No; 2 = Occasionally; 3 = Yes, but it was sometimes forgotten; 4 = Yes].

The mechanisms described above are used to measure in which age categories parental financial teaching is received. First, **parental financial teaching in young childhood** is included as dummy variable. It has a value of 1 if parental financial teaching is only received in young childhood (in other words, only if the mechanisms of habit formation and/or independence are present and not modeling or/and discussion and guidance). This is because the questions used for the habit formation and independence mechanisms concern the younger years (ages 8-12) of the respondents and the questions to detect modeling and discussion and guidance relate to their adolescence (ages 12-16). Second, **parental financial teaching in adolescence** is included as a dummy variable. It has a value of one if parental financial teaching is only received in adolescence (in other words, only if the mechanisms of modeling and/or discussion and guidance are present and not habit formation and/or independence).

Lastly, **parental financial teaching throughout childhood** is also included as a dummy variable. It takes the value of one if parental financial teaching is received in both age categories. A mechanism is present if the value of its corresponding variable differs from one. The limitation of this method is that no distinction is made between the degrees in which the mechanisms are present. However, in order to maintain the interpretability of the results a dummy variable was used. These measurement method is in line with those of Bucciol and Veronesi (2014). Another caveat is that it does not exclude the presence of the other mechanisms in the observed age group, since the data do not provide exact information about the presence of all mechanisms throughout childhood. For instance, a child can also receive pocket money (a proxy for independence) from ages 12 to 16, which can also have an impact on their saving and borrowing behavior in adulthood. In addition, the results of this method can be biased since the observed effect may arise from the functioning of the mechanisms and not through the age category in which the teaching is received. Despite the limitations, this method, using the DHS dataset, is the most convenient to conclude anything about the age at which children can best receive parental financial teaching. Please refer to appendix A for the exact wording of the survey questions.

3.2.3. Control variables

Many studies have yielded results that pertain to saving and borrowing behavior. According to Hira and Mugenda (2000), women are more likely than men to make unnecessary expenditures, which could lead to them having lower savings. A study of Bucciol and Veronesi (2014) supports this view: its findings indicate that women have lower saving amounts than men, as well as that individuals who are employed, self-employed or retired have a higher willingness to save and higher saving amounts than people who do not work. According to the standard life-cycle model, it is expected that young adults have a lower willingness to save and that saving amounts are lower for older individuals. The findings of Bucciol and Veronesi (2014) support this model. According to Webley and Nyhus (2012), the likelihood that an adult has debt increases with age, however this result is not supported by the Nyhus and Webley's study (2001). Next to that, Nyhus and Webley (2001) find that individuals with high education levels have higher savings and debts. The possible explanation they offer is that educated people have student loans. By contrast, the research of Webley and Nyhus (2012) find no significant relation between education and the sum of debt.

Household characteristics also influence the saving and borrowing behavior of individuals. Studies of Bucciol and Veronesi (2014) and Nyhus and Webley (2001) find that larger households have a lower willingness to save and lower saving amounts. These studies also find that households with higher net income have higher savings amounts. In addition, Nyhus and Webley (2001) find that households with higher income have more debts, as it is more likely that they will be granted higher loans than low-income families. However, the study of Webley and Nyhus (2012) shows no significant relation between net income and the sum of debt.

Furthermore, according to Jacobs-Lawson and Hershey (2005), risk-tolerant individuals prefer to invest in risky investments. Since a bank account is not very risky, adults who are risk-tolerant are expected to have lower savings.

Based on the above discussion, the following socio-demographic variables are included as controls in the multivariate analysis of this research: gender, occupation, age, education, household characteristics, net income of household and risk attitude. Please refer to appendix A for an exact definition of all of the control variables included.

3.3. Methodology

It is likely that changes in economic conditions may lead households to save more in some years. Furthermore, according to Statistics Netherlands,³ households in the three largest cities of the Netherlands often live in poverty. It is therefore expected that individuals living in Amsterdam, Rotterdam and The Hague have lower savings and a higher amount of debt. Time and area dummy variables, which represent time and area fixed effects, are consequently included in the estimation, in accordance with the research of Bucciol and Veronesi (2014).

A generalized least square random effects model is used to test the influence of receiving parental financial teaching on financial behavior. The results are easier to interpret than those obtained using probit and ordered probit models.⁴

A random effect model is provided above ordinary least squares, since the results of Breusch and Pagan's (1980) Lagrange Multiplier Test are significant for each regression model. The Breusch-Pagan statistics test whether the variances across entities are zero. If they are, no significant difference exists across units (in other words, no panel-effect is present)

³ Source: <http://www.cbs.nl/NR/rdonlyres/83CC1C97-DC64-4FEC-8535-C651EC5A62DD/0/armoedesignalement2014pub.pdf>

⁴ Probit and ordered probit random effects models are also conducted for the binary dependent variables. As the results are in line with the findings of the GLS, only the results of the GLS are presented in this study.

and a simple OLS estimation is desirable (Torres-Reyna, 2007). As a significant difference across individuals is found in this study, a random effect model is used.

The main assumption of the random effect model is that the time-varying and time-invariant independent variables are assumed exogenous with respect to the error term. However, there is an omitted variable bias if this is not true, which means that the coefficients estimated by a random effect model might be biased (Buccioli and Veronesi, 2014). This can be solved by estimating the model with fixed effects. However, as the independent variable in this study is a variable that does not change over time, a fixed-effects model cannot be estimated. A random effect model is consequently used to conduct the different analyses. In order to reduce the omitted variable bias, as many control variables as possible are included.

Robust standard errors are used in this study to prevent biased standard errors. This is in line with the conclusions of Petersen (2009), who states that the best solution for producing standard errors and correcting confidence intervals is using estimates that are robust to the form of dependence in the data.

In summary, to test the effect of receiving parental financial teaching on saving and borrowing behavior, this study estimates the following regression equation:

$$Y_{i,t} = \alpha + \text{Parental financial teaching variables}_i * \beta + \text{Control variables}_{it} * \beta + \text{Time and area dummy variables}_{it} * \beta + \omega_{it}, \omega_{it} = \mu_i + \varepsilon_{it} \quad (1)$$

Where $Y_{i,t}$ = latent variable, i = respondent, t = year and $\omega_{i,t}$ is the error term. The error term consists of a cross-sectional error term (μ_i) and an individual observation error term (ε_{it}). In this study, the latent variable is replaced with two different dependent variables: saving behavior and borrowing behavior. The parental financial teaching variable is a vector of parental financial teaching variables and the control variable is a vector of the control variables. Time and area dummy variables respectively represent the year of the survey and the area where the respondent lives.

4. Results

The results of this study concerning parental financial teaching on saving and borrowing behavior are presented below in two categories: univariate and multivariate. The

results of an additional test undertaken to explore the effects of parental financial teaching on borrowing behavior is also presented.

4.1. Univariate results

Table II provides an overview of the effects that parental financial teaching in childhood, parental financial teaching in different age categories and different mechanisms have on facets of saving and borrowing behavior.

Panel A shows that parental financial teaching leads to significant changes in both saving and borrowing behavior, as per the ANOVA statistics. The parental financial teaching variable is split into quartiles to make the results easier to interpret. The willingness to save is 18% higher in the quartile of individuals who received the most parental financial teaching in comparison to the lowest quartile. Adults in the highest quartile have approximately €1,500 more savings compared to individuals who received little or no parental financial teaching. The willingness to put money aside in the future is also most present in the highest quartile. Individuals who received much parental financial teaching have 4% fewer loans than those in the lowest quartile. Since the amount of debt is the lowest in the third quartile group, this finding is the first indication that the degree of parental financial teaching has an impact on saving and borrowing behavior.

Panel B then proves that only parental financial teaching during young childhood leads to more savings and fewer loans in adulthood compared with parental financial teaching during adolescence. However, adults who received parental financial teaching in young childhood and adolescence have the highest savings and smallest presence of loans. By contrast, adults have the lowest amount of debt when they only received parental teaching during adolescence. However, this difference is not significant according the ANOVA test. These results therefore indicate that providing parental financial teaching over a long time has the greatest influence on the saving and borrowing behavior of individuals.

Next, panel C indicates that stimulating children to save leads to higher willingness to save and greater savings in adulthood. Adults who were stimulated to start saving most often save almost €1,300 more than those who were not encouraged to save during childhood. Moreover, being stimulated to save leads to lower numbers of both loans and debts. This is reasonable, since stimulating to save in childhood leads to higher savings and thus less need to borrow.

The influence of parental financial teaching on saving and borrowing behavior

Table II: Univariate results

This table presents the univariate results of the effects that parental financial teaching in childhood (panel A), parental financial teaching in different age categories (panel B) and different mechanisms (panel C-F) have on the following facets of saving and borrowing behavior: willingness in the past to save (column 1), amount of savings per year (column 2), willingness to save in future (3), presence of a loan (4), and total amount of debt (column 5). *, **, *** denote significance on the ANOVA test at the 10%, 5% and 1% level respectively.

	Willingness to save	Total savings per year	Willingness to save in future	Presence of a loan	Total debt		Willingness to save	Total savings	Willingness to save in future	Presence of a loan	Total debt
	(1)	(2)	(3)	(4)	(5)		(1)	(2)	(3)	(4)	(5)
Panel A: Parental financial teaching received (divided in quartiles)						Panel D: Presence of discussion/guidance as mechanism (received financial advice)					
1 (low)	0.61	3,464	3.06	0.23	3,128	No	0.62	3,737	3.06	0.22	3,717
2	0.70	4,129	3.21	0.22	3,719	Yes, but only to a certain extent	0.70	3,985	3.23	0.21	2,969
3	0.70	4,158	3.24	0.23	2,899	Yes, they gave me some advice and practical help	0.71	4,215	3.26	0.23	3,036
4 (high)	0.79	5,087	3.44	0.19	3,662	Yes, they gave me advice and practical help	0.76	4,633	3.37	0.20	4,046
P-value ANOVA statistic	0.00***	0.00***	0.00***	0.00***	0.01***	P-value ANOVA statistic	0.00***	0.00***	0.00***	0.00***	0.55
Panel B: Parental financial teaching received in different age categories						Panel E: Presence of habit formation as mechanism (expenditures were monitored)					
Parental financial teaching only received in young childhood	0.57	3,178.53	2.97	0.24	3,914.31	I could decide on all of my expenditures	0.61	3,358	3.10	0.28	4,772
Parental financial teaching only received in adolescence	0.54	2,105.15	2.95	0.30	2,698.14	I could mostly decide how I spent my money	0.73	4,388	3.31	0.26	3,395
Parental financial teaching received throughout childhood	0.72	4,340.42	3.27	0.22	3,355.04	Part of my expenditure was decided by me, the rest by my parents	0.71	4,139	3.27	0.25	3,968
P-value ANOVA statistic	0.00***	0.00***	0.00***	0.00***	0.9254	My parents decided how I spent most of my money	0.72	4,423	3.27	0.22	4,072
Panel C: Presence of modeling as mechanism (received stimulation to save)						Panel F: Presence of independence as mechanism (received pocket money)					
No, not at all	0.59	3,436	3.00	0.25	3,668	No	0.66	3,689	3.13	0.16	2,427
Yes, but only to a certain extent	0.68	3,993	3.18	0.25	4,836	Occasionally	0.70	3,847	3.16	0.22	3,413
Yes, they told me how important saving is	0.71	4,165	3.27	0.21	2,839	Yes, but it was sometimes forgotten	0.65	3,629	3.16	0.25	3,787
Yes, they emphasized the necessity of saving	0.75	4,677	3.36	0.18	2,906	Yes	0.72	4,594	3.33	0.26	4,086
P-value ANOVA statistic	0.00***	0.00***	0.00***	0.00***	0.09*	P-value ANOVA statistic	0.00***	0.00***	0.00***	0.00***	0.08*

Panel D shows that receiving financial advice from parents during childhood leads at a minimum to an increase of 8% in willingness to save and almost €250 more in savings. It also leads to both an increased willingness to put money aside in the future and fewer loans. In contrast, the amount of debt is highest in the group that received the most financial advice from parents during childhood. However, this difference is not significant according to the ANOVA test.

Next, panel E indicates that moderate parental supervision on children's spending patterns leads to the highest willingness to save and greatest saving amounts in adulthood. However, individuals whose expenditures were most highly monitored by their parents during childhood have the lowest number of both loans and debts. These findings therefore show that parental expenditure monitoring during childhood has an effect on both saving and borrowing behavior, regardless of the degree of monitoring.

The results presented in panel F show that receiving pocket money in childhood leads to more willingness to save and higher savings in adulthood. Individuals who consistently received pocket money have approximately €1,000 more savings than adults who never received a childhood allowance. Receiving pocket money during childhood leads to more loans and higher debts in adulthood. Adults who never received pocket money have 10% fewer loans than those who received it on a regular basis.

4.2. Multivariate results

The multivariate results of study encompass saving and borrowing behavior, as presented below.

4.2.1. Saving behavior

Table III reports the influence of parents on the saving behavior of adults. Panel A of this table presents the influence of parental financial teaching on saving behavior. The willingness to save and total savings relative to net income increase by 2% when individuals receive parental financial teaching to the highest degree as opposed to not receiving any (at the 1% statistical level). Total savings and the willingness to save in the future are also significantly larger (at the 1% statistical level) for individuals who received parental financial teaching. These findings support hypothesis 1a, namely parental financial teaching influences the saving behavior of adults. Specifically, parental financial teaching leads to a higher

willingness to save and more savings. This is in line with the study of Bucciol and Veronesi (2014), who also find that parental financial teaching leads to more savings. The findings of the current study that parents influence the formation of their children's financial behavior, support both the planned behavior theory and the family systems theory.

Panel B provides evidence that prolonged parental financial teaching has the largest influence on the saving behavior of adults. All facets of saving behavior are significantly positive (at a 1% or 5% statistical level) when parental financial teaching is received throughout childhood. For instance, individuals who receive parental financial teaching in both age categories are 18% more willing to save than adults who never received such teaching. The results further indicate (at the 10% statistical level) that when parents only teach their children during young childhood, only total savings are significantly influenced. However, this effect is larger when parental financial teaching is also provided during adolescence. It is also noteworthy that only receiving parental financial teaching during adolescence has no impact on saving behavior. Teaching children during their adolescence therefore makes no sense when parental financial teaching has not been provided in previous years. The above results indicate that the largest effect on saving behavior is achieved when parents provide their children with financial education during both childhood and adolescence. Consequently, hypothesis 2a is accepted. This is in line with the study of Bucciol and Veronesi (2014), who also find evidence that the most effective strategy is to give children parental financial teaching throughout childhood.

Next, panel C reports the results of being encouraged to start saving during childhood on saving behavior in adulthood. Individuals are 4% more willing to save when they are frequently stimulated during childhood to start saving than when they receive no form of stimulation (at the 1% statistical level). Total savings, future savings and savings relative to net income are also larger for adults who are stimulated in childhood to save (at the 1% statistical level). Since parental stimulation is a proxy of parents' modeling role in this study, these findings support hypothesis 3a on the role of modeling as mechanism. Parents thus influence the saving behavior of their children by being a role model. In particular, parents providing examples to their children, by stimulating particular saving behavior, results in a higher willingness to save and more savings.

Table III: Multivariate results, saving behavior

This table presents the multivariate results of the effects that parental financial teaching in childhood (panel A), parental financial teaching in different age categories (panel B) and different mechanisms (panel C-F) have on the following facets of saving behavior: willingness in the past to save (column 1), amount of savings per year (column 2), willingness to save in future (column 3), and total savings relative to net income (column 4). *, **, *** denote significance at the 10%, 5% and 1% level respectively, P-value based on robust standard errors in parentheses.

	Willingness to save	Total savings per year (logarithm)	Willingness to save in future	Savings to net income
	(1)	(2)	(3)	(4)
Panel A: Parental financial teaching received				
Parental financial teaching received	0.02*** (0.00)	0.17*** (0.00)	0.04*** (0.00)	0.02*** (0.00)
Female	-0.03* (0.10)	-1.08*** (0.00)	0.01 (0.82)	-0.11*** (0.00)
Age (in years)	-0.00** (0.01)	-0.01 (0.43)	-0.01*** (0.00)	-0.00 (0.26)
Retired (age >65)	0.06*** (0.00)	0.31 (0.10)	0.14*** (0.00)	0.04* (0.06)
High education	0.08* (0.09)	1.28*** (0.00)	0.16* (0.07)	0.12*** (0.00)
Middle education	0.03 (0.59)	0.23 (0.61)	0.04 (0.67)	0.03 (0.54)
Employee	0.10*** (0.00)	1.06*** (0.00)	0.20*** (0.00)	0.10*** (0.00)
Self-employee	0.00 (0.92)	0.46 (0.27)	0.12* (0.08)	0.05 (0.25)
Participation in a partnership	0.18** (0.03)	2.02** (0.01)	0.37** (0.01)	0.19** (0.01)
Risk attitude 1	0.01** (0.04)	0.04 (0.17)	0.02** (0.03)	0.00 (0.16)
Risk attitude 2	0.01* (0.08)	0.01 (0.83)	0.02** (0.01)	0.00 (0.73)
Number of children	-0.04** (0.02)	-0.87*** (0.00)	-0.05 (0.15)	-0.09*** (0.00)
Size of the household	0.01 (0.60)	0.43*** (0.01)	0.03 (0.41)	0.04** (0.01)
Net income (logarithm)	0.02*** (0.00)	0.52*** (0.00)	0.03** (0.02)	0.03** (0.01)
Area fixed effects	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES
Constant	0.12 (0.31)	-4.28*** (0.00)	2.45*** (0.00)	-0.18 (0.17)
R ²	0.054	0.109	0.085	0.088
N	8964	8836	8863	8825

Continued table III: Multivariate results, saving behavior

This table presents the multivariate results of the effects that parental financial teaching in childhood (panel A), parental financial teaching in different age categories (panel B) and different mechanisms (panel C-F) have on the following facets of saving behavior: willingness in the past to save (column 1), amount of savings per year (column 2), willingness to save in future (column 3), and total savings relative to net income (column 4). *, **, *** denote significance at the 10%, 5% and 1% level respectively, P-value based on robust standard errors in parentheses.

	Willingness to save	Total savings per year (logarithm)	Willingness to save in future	Savings to net income		Willingness to save	Total savings per year (logarithm)	Willingness to save in future	Savings to net income
	(1)	(2)	(3)	(4)		(1)	(2)	(3)	(4)
Panel B: Parental teaching received in different age categories					Panel D: Presence of discussion/guidance as mechanism (received financial advice)				
Parental financial teaching only received in young childhood	0.08 (0.16)	0.83* (0.09)	0.10 (0.33)	0.08 (0.10)	Received financial advice	0.03*** (0.00)	0.25*** (0.00)	0.06*** (0.00)	0.02*** (0.00)
Parental financial teaching only received in adolescence	0.01 (0.90)	0.31 (0.68)	0.00 (1.00)	0.03 (0.67)	R ²	0.050	0.104	0.082	0.083
Parental financial teaching received throughout childhood	0.18*** (0.00)	1.62*** (0.00)	0.24** (0.01)	0.16*** (0.00)	Area fixed effects	YES	YES	YES	YES
R ²	0.055	0.107	0.085	0.087	Year fixed effects	YES	YES	YES	YES
Area fixed effects	YES	YES	YES	YES	Socio-demographic controls	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	Number of observations	9362	9225	9256	9213
Socio-demographic controls	YES	YES	YES	YES	Panel E: Presence of habit formation as mechanism (expenditures were monitored)				
Number of observations	9569	9425	9457	9412	Expenditures were monitored	0.01** (0.03)	0.13** (0.02)	0.03** (0.02)	0.01** (0.02)
Panel C: Presence of modeling as mechanism (received stimulation to save)					R ²	0.047	0.101	0.081	0.081
Stimulated to save	0.04*** (0.00)	0.36*** (0.00)	0.08*** (0.00)	0.04*** (0.00)	Area fixed effects	YES	YES	YES	YES
R ²	0.052	0.105	0.084	0.086	Year fixed effects	YES	YES	YES	YES
Area fixed effects	YES	YES	YES	YES	Socio-demographic controls	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	Number of observations	9406	9270	9295	9259
Socio-demographic controls	YES	YES	YES	YES	Panel F: Presence of independence as mechanism (received pocket money)				
Number of observations	9461	9320	9349	9308	Received pocket money	0.00 (0.46)	0.06 (0.35)	0.01 (0.48)	0.01 (0.33)
					R ²	0.045	0.098	0.080	0.079
					Area fixed effects	YES	YES	YES	YES
					Year fixed effects	YES	YES	YES	YES
					Socio-demographic controls	YES	YES	YES	YES
					Number of observations	9576	9431	9463	9418

Panel D shows that giving children financial advice in budgeting significantly influences all measured facets of saving behavior (at the 1% statistical level). Receiving financial advice during childhood leads to a higher willingness to save and more savings in adulthood. Moreover, adults who received the most parental advice on budgeting during childhood have 2% more savings relative to their net income than individuals who never received such advice in childhood. The findings of this study thus support hypothesis 3a, namely that the guidance and discussion mechanism is one way in which parents influence the saving behavior of their children. This is in line with the findings of Bucciol and Veronesi (2014) and Webley and Nyhus (2012).

Panel E then presents the results of controlled spending patterns in childhood on individual saving behavior. Parental expenditure monitoring has an increasing effect on all observed types of saving behavior (at the 5% statistical level). Specifically, the willingness to save among adults increases by 1% when parents control all expenses in childhood as opposed to undertaking no monitoring. Since monitoring the expenditures of their children is a method for parents to influence habit formation, the findings of this research support hypothesis 3a on the habit formation mechanism. By influencing the habit formation of their children, parents have an impact on the saving behavior of adults.

The influence of receiving pocket money during childhood on saving behavior is shown in panel F. The saving behavior of adults who received pocket money is not significantly different from those who never did. Since pocket money is a proxy for being independent in childhood, hypothesis 3a is rejected for the independence mechanism. Adults who had more financial responsibility in childhood thus do not behave financially differently than others. Although the hypothesis cannot be accepted, the findings of this study are partly supported by the research of Webley and Nyhus (2006), which states that independence is not the most relevant mechanism for explaining the effect of parental education.

Furthermore, the control variables on average have the expected sign as in previous studies; please refer to panel A for the exact results of the control variables. As expected, women have lower savings than men, higher education levels lead to higher savings, adults with a higher net income save more, risk-tolerant individuals are less willing to save, employees save more, and households with more children have lower savings. However, the influence of the number of household members on saving behavior is not as expected, because this study shows that having more household members leads to more savings. A possible explanation for this unexpected observation is that larger households likely have more income to spend and therefore save more. If this explanation is correct, the size of the

household should have no effect on the savings amount relative to net income, since this dependent variable controls for changes in net income. However, in this study households with more than one member save significantly more relative to their net income than single households. Another explanation is that larger households have more children and therefore save more with regard to future expenses (e.g. for education). However, this explanation is also not supported by the observations of this study, as the number of children leads to significantly lower savings. The finding that larger households save more can therefore not be explained by this study. It is also noteworthy that individuals who are retired (here adults above the age of 65) have a higher willingness to save than people who are younger than 65. The reason for this unexpected finding may be methodological in nature: it could be that most people in the sample entered retirement after age 65. It is likely that individuals nearing retirement are more willing to save to cope with their upcoming drop in income.

4.2.2. Borrowing behavior

Table IV presents the influence of parents on the borrowing behavior of individuals. Panel A shows that adults who received the most parental financial teaching have 1% fewer loans than those who never received such teaching (at the 1% statistical level). The amount of debt is also accordingly lower as parental financial teaching is provided (at the 1% statistical level). Hypothesis 1b is consequently accepted. This study supports the view that parental financial teaching influences borrowing behavior. This conclusion is in line with the study of Norvilitis and MacLean (2010) and the planned behavior and family systems theories.

In contrast, panel B provides no evidence for hypothesis 2b. Receiving prolonged parental financial teaching has no significant effect on the borrowing behavior of adults. Furthermore, receiving such teaching in only one age category has no effect on the number of loans and debts. Although parental financial teaching has an effect on borrowing behavior, it does not matter in which age category it is received.

Table IV: Multivariate results, borrowing behavior

This table presents the multivariate results of the effects that parental financial teaching in childhood (panel A), parental financial teaching in different age categories (panel B) and different mechanisms (panel C-F) have on the following facets of borrowing behavior: presence of a loan (column 1), total debt (column 2), and total debt relative to net income (column 3). *, **, *** denote significance at the 10%, 5% and 1% level respectively, P-value based on robust standard errors in parentheses.

	Presence of a loan	Total debt (logarithm)	Total debt to net income
	(1)	(2)	(3)
Panel A: Parental financial teaching received			
Parental financial teaching received	-0.01*** (0.00)	-0.09*** (0.00)	-0.01*** (0.00)
Female	-0.03* (0.10)	-0.30* (0.09)	-0.03* (0.08)
Age (in years)	-0.01*** (0.00)	-0.05*** (0.00)	-0.01*** (0.00)
Retired (age >65)	0.02 (0.27)	0.04 (0.77)	0.00 (0.87)
High education	0.01 (0.90)	0.18 (0.56)	0.02 (0.58)
Middle education	-0.02 (0.74)	0.03 (0.91)	0.00 (0.95)
Employee	-0.02 (0.30)	-0.12 (0.37)	-0.01 (0.30)
Self-employee	0.04 (0.31)	0.23 (0.49)	0.02 (0.56)
Participation in a partnership	0.05 (0.44)	1.20 (0.19)	0.11 (0.19)
Risk attitude 1	-0.00 (0.34)	-0.05* (0.07)	-0.01* (0.08)
Risk attitude 2	-0.00 (0.20)	-0.01 (0.87)	-0.00 (0.85)
Number of children	0.01 (0.55)	0.00 (0.98)	0.00 (0.88)
Size of the household	-0.02 (0.16)	-0.17 (0.29)	-0.02 (0.22)
Net income (logarithm)	-0.01 (0.12)	-0.04 (0.40)	-0.01* (0.07)
Area fixed effects	YES	YES	YES
Year fixed effects	YES	YES	YES
Constant	1.01*** (0.00)	6.90*** (0.00)	0.78*** (0.00)
R ²	0.065	0.054	0.054
Number of observations	8970	7000	6991

Continued table IV: Multivariate results, borrowing behavior

This table presents the multivariate results of the effects that parental financial teaching in childhood (panel A), parental financial teaching in different age categories (panel B) and different mechanisms (panel C-F) have on the following facets of borrowing behavior: presence of a loan (column 1), total debt (column 2), and total debt relative to net income (column 3). *, **, *** denote significance at the 10%, 5% and 1% level respectively, P-value based on robust standard errors in parentheses.

	Presence of a loan	Total debt (logarithm)	Total debt to net income (%)		Presence of a loan	Total debt (logarithm)	Total debt to net income (%)
	(1)	(2)	(3)		(1)	(2)	(3)
Panel B: Parental teaching received in different age categories				Panel D: Presence of discussion/guidance as mechanism (received financial advice)			
Parental financial teaching only received in young childhood	-0.01	0.05	0.00	Received financial advice	-0.02***	-0.13**	-0.01**
	(0.80)	(0.91)	(0.97)		(0.01)	(0.03)	(0.03)
Parental financial teaching only received in adolescence	0.08	0.58	0.05	R ²	0.061	0.052	0.052
	(0.39)	(0.45)	(0.48)	Area fixed effects	YES	YES	YES
Parental financial teaching received throughout childhood	-0.05	-0.26	-0.03	Year fixed effects	YES	YES	YES
	(0.27)	(0.52)	(0.49)	Socio-demographic controls	YES	YES	YES
R ²	0.064	0.054	0.054	Number of observations	9368	7269	7259
Area fixed effects	YES	YES	YES	Panel E: Presence of habit formation as mechanism (expenditures were monitored)			
Year fixed effects	YES	YES	YES	Expenditures were monitored	-0.01**	-0.08	-0.01
Socio-demographic controls	YES	YES	YES		(0.03)	(0.11)	(0.10)
Number of observations	9575	7403	7392	R ²	0.066	0.056	0.056
Panel C: Presence of modeling as mechanism (receiving stimulation to save in childhood)				Area fixed effects	YES	YES	YES
Stimulated to save	-0.03***	-0.19***	-0.02***	Year fixed effects	YES	YES	YES
	(0.00)	(0.00)	(0.00)	Socio-demographic controls	YES	YES	YES
R ²	0.066	0.055	0.055	Number of observations	9412	7300	7291
Area fixed effects	YES	YES	YES	Panel F: Presence of independence as mechanism (received pocket money)			
Year fixed effects	YES	YES	YES	Received pocket money	0.00	0.01	0.00
Socio-demographic controls	YES	YES	YES		(0.89)	(0.86)	(0.88)
Number of observations	9467	7328	7318	R ²	0.061	0.053	0.053
				Area fixed effects	YES	YES	YES
				Year fixed effects	YES	YES	YES
				Socio-demographic controls	YES	YES	YES
				Number of observations	9582	7412	7401

Panel C shows that children whose parents encouraged them to save have fewer loans and lower debts in adulthood (at the 1% statistical level) compared with adults who were not stimulated to save during childhood. In addition, the fraction of debt relative to net income is smaller (at the 1% statistical level) for individuals who were stimulated to start saving during childhood. Hypothesis 3b is therefore accepted for the modeling mechanism. Modeling is thus a mechanism that explains parental influence on the borrowing behavior of adults. Although the measure of modeling in this case relates only to savings, it is likely that the finding is plausible. Adults who were stimulated to save during childhood have higher savings (please refer to Section 4.2.1) and therefore less need to borrow money. Furthermore, it is likely that when parents stimulate their children to save, they also stimulate other financial behavior. Consequently, parents also impact borrowing behavior by serving as role models and stimulating their children.

Next, panel D reports the effect that giving financial advice on budgeting to children has on borrowing behavior in adulthood. Giving such advice to children leads to lower debt in adulthood (at the 5% statistical level). In addition, individuals who received advice during childhood to a large extent have 2% fewer loans in adulthood than those who never received parental advice (at the 1% statistical level). These findings therefore prove that parents influence the borrowing behavior of individuals through guidance and discussion. Hypothesis 3b is thus accepted for the guidance and discussion mechanism. This is in line with the research of Norvilitis and MacLean (2010), who find that teaching children how to manage money leads to lower debt.

Panel E shows the effect of parental control of childhood spending on borrowing behavior. The results indicate that only loan existence is influenced by parental monitoring roles (at the 5% statistical level). The amount of debt is not affected by the freedom adults had to spend their money as they pleased as children. The results therefore provide partial evidence that habit formation is a mechanism that explains the influence of parents on the future borrowing behavior of their children. Hypothesis 3b is thus partly accepted for the habit formation mechanism.

As with saving behavior, independence is also not a mechanism that explains the role of parents on the financial behavior of their children in relation to borrowing. As shown in panel F, receiving pocket money during childhood has no influence on the number of loans or the debts of adults. Hypothesis 3b, about the independence mechanism, is therefore rejected.

The control variables are in line with the study of Webley and Nyhus (2012); please refer to panel A for the exact results of the control variables. Thus, older persons have fewer

loans and lower debts. An explanation for this finding is that older persons face more difficulties in obtaining loans than young adults. Older adults also have had more time to repay loans that they accumulated during their younger years. The significant results concerning risk attitude and borrowing behavior have not been observed in previous studies. An explanation of why risk attitude matters for borrowing behavior is that risk-tolerant individuals prefer to invest in risky investments (please refer to Section 3.2.3). Loans can be regarded as risky. However, not all loans are subject to high risk, since some carry low interest and have long repayment periods. Surprisingly, is that the other variable that measures risk attitude is not significant, although both variables measure individual attitudes to risk. It is therefore hard to conclude that risk attitude influences individual borrowing behavior. The results also show that women have lower numbers of loans and debts than men. This has not been discovered in previous studies. A possible explanation is that females take fewer risks than their male counterparts (Eckel and Grossman, 2008). Noteworthy is that my findings about the control variables are not in line with the study of Nyhus and Webley (2001). An explanation is that they use surveys of the DHS before the year 2000. According to Buccioli and Veronesi (2014), surveys before 2000 were primarily completed by wealthier households. The present study is therefore not comparable with the study of Nyhus and Webley (2001).

4.3. Additional test for the effect of parental financial teaching on borrowing behavior

Although the different tests for borrowing behavior show that parental financial teaching leads to fewer loans and less debt, it is hard to state that this is in general positive behavior. Borrowing money is not always a sign of bad financial behavior. As mentioned in the introduction, individuals borrow money for instance to make stable and expensive purchases and to protect themselves against unexpected events. Borrowing to pay tuition fees is also not a sign of bad borrowing behavior, since it is likely that future income is reserved in order to repay the loan within the specified payment terms. However, using credit from mail-order companies or credit cards is generally a poor form of borrowing behavior, seeing as the interest on these types of loans is often high and the terms and conditions are unfavorable.

In order to determine whether parental financial teaching reduces bad borrowing behavior, I conduct an additional test. Table V presents the univariate results of receiving parental financial teaching on the existence and debt amount of related to credit from mail-order companies and credit cards, since both are common examples of bad loan forms.

Table V: Additional test, borrowing behavior

This table presents the univariate results of the effect that parental financial teaching in childhood has on following facets of borrowing behavior: Existence of credits from mail-order companies (column 1), debt amount on credits from mail-order companies (column 2), existence of credit cards (3), and debt amount on credit cards(column 4). *, **, *** denote significance on the ANOVA test at the 10%, 5% and 1% level respectively.

Parental financial teaching received (divided in quartiles)	Existence of credits from mail-order companies	Debt amount on credits from mail- order companies	Existence of credit cards	Debt amount on credit cards
	(1)	(2)	(3)	(4)
1 (low)	0.02	22	0.04	74
2	0.01	6	0.04	41
3	0.02	16	0.05	72
4 (high)	0.00	1	0.03	10
P-value ANOVA test	0.00***	0.00***	0.00***	0.00***

For the individuals in the highest quartile of parental financial teaching, the existence of both loans and the corresponding debt shields are significantly lower compared to the other quartiles (according the ANOVA test). Moreover, the group that receives a minimum of parental financial teaching has the highest number of credits from mail-order companies. These individuals also have the highest amount of debt on both type of loans. Consequently, this additional test shows that parental financial teaching reduces individuals' bad borrowing behavior.

5. Conclusion and discussion

Several previous studies have evaluated the role of financial education in financial behavior, in order to improve the financial decisions of households. This paper investigates the role that parents play in the formation of their children's saving and borrowing behavior. Based on the results I conclude that receiving parental financial teaching leads to a higher willingness to save, more savings, fewer loans and lower debts in adulthood. Both the planned behavior and family systems theories support the finding that parents influence the saving and borrowing behavior of their children.

Specifically, I find that the effect of parental financial teaching on saving behavior is the largest when children receive this teaching during both their young childhood and their adolescence. This is logical, since children who received prolonged financial education come more frequently into contact with the advantages of parental financial teaching. However, this result is not without biases. The measurement method used do not exclude the presence of other forms of parental teaching in the observed age groups, since the data do not provide

sufficient information about the precise age at which parental financial teaching is received. Future research should therefore include data about the exact age at which children receive parental financial teaching in order to present more representative conclusions.

Additionally, this research offers proof that modeling, guidance and discussion, and habit formation are mechanisms that explain the manner in which parents influence the formation of their children's saving and borrowing behavior. In the case of borrowing behavior, my findings show that parents have more impact as models and advisory agents than as influencers in the formation of habits. This is in line with Webley and Nyhus (2006), who state that modeling and discussion/guidance are the most relevant mechanisms. A possible explanation is that these mechanisms addressed financial behavior directly and not in an indirect way such as by looking at the habit formation and independence mechanisms. However, this research does not describe the full effect of the mechanisms, since parents have more possibilities to be involved in the different mechanisms than covered in this study. For instance, pocket money is not the only tool that parents have to give children financial responsibilities. Future research should therefore include more information about parent's attempts to make children more financially aware, in order to better observe the effects of the four mechanisms.

This study has a number of limitations, each of which points the way to future research. First, it is likely that there are more mechanisms behind the effects that parents have on their children's saving and borrowing behavior than investigated here. For instance, Cronqvist and Siegel (2015) find that genetic differences between individuals explain one third of the variation in saving behavior. Future research should thus include heritability in order to obtain a better and more representative view of why parents influence the saving and borrowing behavior of their children. Second, it is hard to state on basis of my findings whether parental financial teaching has positive or negative effects on borrowing behavior, since not all types of loans represent bad borrowing behavior. Although my additional test on borrowing behavior indicates that parental financial teaching reduces bad borrowing behavior, future research should investigate this in more detail to achieve clear and distinct conclusions. Third, the results are not controlled for other forms of financial education. For instance, previous studies have observed that providing individuals with financial education in the workplace influences saving or borrowing behavior (Bayer et al., 2009). It would therefore be interesting for future research to study the benefit of parental teaching in comparison to other types of financial education. Fourth, while only the heads of households are observed here, it

is likely that other household members also influence financial decisions. Without information on other household members, the results of my study are thus biased.

Despite these limitations, this study adds to the existing literature concerning parental financial teaching on the saving and borrowing behavior of adults. First, it confirms existing findings in the area of parental financial teaching. Second, it provides new insights into the influence of receiving parental teaching throughout childhood and the effect of parental financial teaching on reducing bad borrowing behavior. Third, it outlines how parents influence the future saving and borrowing behavior of their children.

Furthermore, the results are also useful and relevant for policy makers. The indication that parents play an important role in the formation of children's financial behavior means that policy makers should stimulate parents to provide their children with financial teaching. They could achieve this goal by arming parents with information on how to familiarize their children with making financial decisions.

In conclusion, parents influence the formation of their children's saving and borrowing behavior. However, further research on the topic is needed for more representative results and explanations.

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Appendix A: Survey questions and construction of key variables

Saving behavior	<ul style="list-style-type: none"> - Willingness to save: Dummy variable indicating [1] when respondents answered: “Yes” to the following question: “Did your household put any money aside in the past 12 months?” and [0] otherwise. - Total savings: The amount of saving per year. Derived from the following question: “How much money did your household put aside in the past 12 months?”, with a discrete answer scale. This scale have seven tiers between 0 and more than 75,000 Euros. The continuous variable is set equal to the central value of each range. For the extreme ranges, the threshold value is used to create a continuous variable. - Willingness to save in future: Ordinal variable indicating: [1] when respondents answered: “No, certainly not”, [2] when respondents answered: “No, probably not”, [3] when respondents answered: “Yes, perhaps”, and [4] when respondents answered: “Yes, certainly” to the following question: “Is your household planning to put money aside in the next 12 months?” - Total savings to net income: Measured as total savings per year divided by net income.
Borrowing behavior	<ul style="list-style-type: none"> - Presence of a loan: Dummy variable indicating [1] when respondents answered: “Yes” to the following question: “Did you, on 31 December <year>, have one or more <type of loan>?” and [0] otherwise. The type of loan is one of the following: private loans; extended lines of credit; credits by mail-order companies; finance credit; loans from family, friends, or acquaintances; study loans; credit cards; and other loans. - Total debt: The amount of total debt on the different loans of the respondents. Derived from the following question: “What was the remaining debt on your <type of loan> on 31 December <year>?” - Total debt to net income: Measured as total debt divided by net income.
Parental financial teaching	<ul style="list-style-type: none"> - Parental financial teaching received: The degree in which parental financial teaching is received. It is measured as the total sum of the ordinal answer scales of the four questions described below, which indicate the presence of different mechanisms. The value of the variable ranges from 4 to 17. - Modeling mechanism / received stimulation to save: Ordinal variable indicating: [1] when respondents answered: “No not at all”, [2] when respondents answered: “Yes, but only to a certain extent”, [3] when respondents answered: “Yes, they told me how important saving is”, and [4] when respondents answered: “Yes, they emphasized the necessity of saving” to the following question: “Did your (grand)parents stimulate you to save money between the ages of 12 and 16?” - Discussion and guidance mechanism / received financial advice: Ordinal variable indicating: [1] when respondents answered: “No”, [2] when respondents answered: “Yes, but only to a certain extent”, [3] when respondents answered: “Yes, they gave me some advice and practical help”, and [4] when respondents answered: “Yes, they gave me advice and practical help” to the following question: “Did your (grand)parents try to teach you how to budget when you were between 12 and 16 years of age?” - Habit formation mechanism / expenditures were monitored: Ordinal variable indicating: [1] when respondents answered: “I could decide on all of my expenditures”, [2] when respondents answered: “I could mostly decide how I spent my money”, [3] when respondents answered: “Part of my expenditure was decided by myself, the rest by my parents”, [4] when respondent answered: “My parents decided how I spent most of my money”, and [5] when respondents answered: “My parents decided how I spent all of my money” to the following question: “When you were between 8 and 12 years of age, could you spend your money as you pleased?” - Independence mechanism/ received pocket money: Ordinal variable indicating: [1] when respondents answered: “No”, [2] when respondents answered: “Occasionally”, [3] when respondents answered: “Yes, but it was sometimes forgotten”, and [4] when respondents answered: “Yes” to the following question: “When you were between 8 and 12 years of age, did you receive an allowance from your parents? By allowance we mean a fixed amount received on a regular basis”. - Parental financial teaching in young childhood: Dummy variable indicating [1] when respondents only received in young childhood parental financial teaching, and [0] otherwise. Parental financial teaching is only received in young childhood if the mechanisms habit formation or/and independence are present and not the mechanisms modeling and/or discussion and guidance. A mechanism is present if the value of its corresponding value differs from 1 (please refer to the four mechanism variables described above). - Parental financial teaching in adolescence: Dummy variable indicating [1] when respondents only received parental financial teaching in adolescence, and [0] otherwise. Parental financial teaching is only received in adolescence if the mechanisms modeling and/or discussion and guidance are present and not the mechanisms habit formation and/or independence. A mechanism is present if the value of its corresponding value differs from 1 (please refer to the four mechanism variables described above). - Parental financial teaching throughout childhood: Dummy variable indicating [1] when respondent received throughout childhood parental financial teaching, and [0] otherwise. Parental financial teaching is received throughout childhood if parental teaching is received in both young childhood (if the mechanisms habit formation and/or independence are present) and adolescence (if the mechanisms modeling and/or discussion and guidance are present). A mechanism is present if the value of its corresponding value differs from 1 (please refer to the four mechanism variables described above).
Gender	Dummy variable indicating [1] if the respondent is female and [0] for male.
Age	Age of the respondent.
Retired	Dummy variable indicating [1] if age of the respondent is above 65 and [0] otherwise.
Occupation	<ul style="list-style-type: none"> Employee: Dummy variable indicating [1] if the respondent works as an employee and [0] otherwise. Self-employee: Dummy variable indicating [1] if the respondent is self-employed and [0] otherwise. Participation in a partnership: Dummy variable indicating [1] if the respondent participates in a partnership and [0] otherwise. No work: Dummy variable indicating [1] if the respondent is unemployed and [0] otherwise (included as omitted variable in the analysis).
Education	<ul style="list-style-type: none"> High education: Dummy variable indicating [1] if the respondent completed vocational college or university education as highest education and [0] otherwise. Middle education: Dummy variable indicating [1] if the respondent completed pre-vocational education, pre-university education, or senior vocational training as highest education and [0] otherwise. Low education: Dummy variable indicating [1] if the respondent completed special education, kindergarten/primary school, other sort of education/training, or no form of education as highest education and [0] otherwise (included as omitted variable in the analysis).

Continued appendix A: Survey questions and construction of key variables

Risk attitude	Both risk attitude variables ranges from 1 to 7. Where [1] indicates a risk-tolerant individual and [7] a risk-averse individual. Derived from a factor analysis (please refer to appendix B for the complete factor analysis) based on the degree of agreement on the following statements (statements with an (R) has been reversed to make all the statements consistent) using a seven-point scale [1="totally disagree" to 7="totally agree"]: "I think it is more important to have safe investments and guaranteed returns, than to take a risk to have a chance to get the highest possible returns." "I do not invest in shares, because I find this too risky." "If I think an investment will be profitable, I am prepared to borrow money to make this investment" (R) "I want to be certain that my investments are safe." "If I want to improve my financial position, I should take financial risks." (R) "I am prepared to take the risk to lose money, when there is also a chance to gain money." (R)
Number of children	Number of children of the respondent.
Size of households	Household size of the respondent.
Net income	Net income of the respondent. This variable is computed through the DHS itself. In order to create net income, mortgage interest payments and income tax are subtracted from a large range of different sources of income. ⁵

Appendix B: Risk factor analysis

Table VI: Risk factor analysis

Factor analysis of the risk aversion using principal-component factors with a varimax rotation factors. The statement with an (R) has been reversed to make all the statements consistent. The largest factor loadings in each column are highlighted in bold

Factors	Factor 1	Factor 2
Risk attitude 1	-0.08003	0.48955
Risk attitude 2	0.16419	0.27169
Risk attitude 3 (R)	0.37687	-0.11616
Risk attitude 4	-0.09346	0.49864
Risk attitude 5 (R)	0.42404	-0.11761
Risk attitude 6 (R)	0.40858	0.02955

⁵ In the documentation of the data sets, the calculation of net income is fully described. That can be found at: <http://www.dhsdata.n.l/site/users/login>