The effect of social interaction on economic behavior.

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Abstract

In this study we empirically investigate whether social interactions influence the economic behavior of individuals. Our analysis focuses on Dutch households as we use data from the DNB Household Survey creating a panel for the years 2010-2017. After controlling for a number of demographic and household characteristics we find that there are some significant but moderate peer effects. Specifically, our analysis exhibits significant results for some of the measures related to the locus of control of individuals, the respondents' bequest motive and their risk aversion. Additionally, we show that the extent of stock market participation is negatively correlated with the financal advice given from parents, friends and acquaintances.

Keywords: Social interactions, households, economic attitude

1. Introduction

Over the past few years, both the empirical and theoretical literature established the importance of social interactions in individuals' behavior. Most studies focused their interest on the impact of such networks on general outcomes such as crime rates, while economists were mostly attracted by the effects of social interactions on financial decisions.

Our study focuses on the analysis of the effects of social interactions on the economic behavior of Dutch households. In order to examine this effect we use data from the DNB Household Survey that provides numerous questions regarding individual, household and peer characteristics. The most important feature of this database that helps overcome usual problems around social interaction analysis is that the respondents of the survey are asked to define their social circle (friends, neighbors, acquaintances, or co-workers) and refer to their perceptions for some of their peers' characteristics. Therefore, we combine several waves provided from the DNB Household Survey

for the years 2010-2017 and we construct a rich dataset containing information on demographic characteristics, household related information, income status, health condition and peer characteristics such as age, number of persons in the household, education, employment, hours per week that men and women work and income as perceived by the respondents of the survey. We also construct a binary variable related to peer effects that indicates how important is for individuals to take advice from their parents, friends and acquaintances when making financial decisions.

In our analysis we try to examine the role of social interctions in several aspects of economic behavior. Therefore, we use several dependent variables each one describing a different characteristic of individuals' economic behavior. Specifically, we estimate 9 different models focusing on the locus of control of individuals, their risk aversion, their bequest motive, their savings and the number of stocks/shares they have. For a few of these variables we also apply different measures. For the variable describing the locus of control of individuals we use 3 different variables that show whether the respondents highly evaluate saving and careful investing, whether they believe that their life is determined by their own actions and, whether they believe that it is a matter of fate that they become rich or poor. For the economic behavior related to risk aversion we use 2 different dependent variables. The first one describes whether individuals think that 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 and the other one asks directly about the risks that the respondents have taken with investments over the past few years. Finally, for the estimation of peer effects on individuals' bequest motive we apply 2 different measures, a variable that describes whether the respondents consider important to save money so as to leave valuable assets to their children and, a variable that refers to the chance that the respondents will leave an inheritance.

As we try to infer whether social interactions have an impact on different aspects of economic behavior we have to estimate different models for each one of the dependent variables of interest. Due to the nature of the variables describing individuals' locus of control (locus01, locus07, locus12), those referring to risk aversion (risk aversion, risks take) and one of those describing the bequest motive (saving for inheritance) we estimate ordered probit regression models. For the binary variable referring to individuals' savings we estimate a logistic regression model and for the continuous variables named bequest motive and company stocks we apply panel fixed effects.

The estimation results support the existence of a moderate association between peer characteristics and individuals' economic behavior both in statistical significance and magnitude. Only 2 out of the 3 measures related to the locus of control of individuals are found to be correlated with some peer characteristics and only the one referring to whether they believe that it is a matter of fate that they become rich or poor is associated with the perceived average peer income. The results are more supportive to the existence of a significant relation between peer effects and risk aversion while both measures applied are significantly associated with the average peer income. The variables related to the motive of individuals to leave to their children an inheritance are both significantly related to some peer characteristics, while the variable describing the number of companies of which individuals have stocks/shares is correlated only with the variable that defines the financial advice given from parents, friends and acquaintances. The dependent variable referring to the savings of the household for the last 12 months exhibits no significant relation with peers' characteristics.

The analysis is organized as follows. Section 2 presents the literature review related to social interactions in general and related to economic or financial behavior. Section 3 describes the dataset used in our analysis and offers a few descriptive statistics for the variables of interest. Section 4 presents our baseline specification and refers to the models of estimation for each one of the dependent variables. Section 5 reports the estimation results while section 6 concludes.

2. Literature Review

Recently, researchers affiliated with economics and finance pulled their attention out of corporate finance and devoted to the analysis of the financial decisions made by individuals and in general by households, or as referred in the literature, household finance. As pointed out by Tufano (2009), the increased participation of individuals in financial markets expands the size of the industry and thus attracts the interest of economists to this field, while the investment mistakes observed due to the complexity of the market as well as the suboptimal decision making by individuals make the work in this field crucial. This relates to the "participation puzzle" referred to the work of Guiso et al. (2012) that states that many households do not invest in risky assets and diverge from what theory predicts, while those who do participate

in financial markets may not eventually follow the predicted homogeneous behavior.

Campbell (2006) provides a definition of household finance as the field of household economics that studies how households use financial instruments to attain their objectives. Households plan their spending decisions related to saving, investment decisions, portfolio choices, and borrowing based on their budget constraint. Guiso et al. (2012) mention that all households' activities involving payments, debt, savings and insurance contracts also require financial knowledge and information to be used. Apart from financial literacy obtained through education or through personal involvement in financial markets, social interactions also play an important role. Social interaction is defined as the relationships within a group of people where the values and the information that an individual uses to make decisions may be influenced by the values or the decisions made by others in his group (Kedia 2009). As Tolciu (2010) indicates, social interactions include the impact of social norms, role models and networks on individual behavior. Likewise, social interaction models are defined in economic literature as models in which the decisions made by individuals are more likely to be affected by others' decisions rather than by price systems or utility maximization problems.

2.1. Social learning channels

One of the channels through which social interactions could influence individuals' decisions is related to the theory of conformity presented by Bernheim (1994). His model of social interaction refers to individuals who care about both own consumption or the so called "intrinsic utility" and their social status which is indirectly signaled by individuals' actions. The theory of conformity implies that individuals are willing to deviate from their preferred behavior and conform to a standard homogeneous behavior if the utility regarding social status is higher relative to that derived from consumption. Thus, following social norms and specific patterns of behavior ensures the protection of individuals' social status. However, the analysis explains that not all individuals' actions are governed by the need to be socially conformed. An additional interesting study linked to the way that social interactions work is that of Banerjee (1992) who presents a simple theoretical model characterized by herd behavior where individuals make decisions by following what others did before them rather than using their own information. The model examines the rationale behind such kind of decision making and although it might seem rational to use the information

exploited by others' actions, this kind of sequence makes everyone's decision less relevant to own information and consequently less instructive to others. Individuals end up observing others' actions and thus imitate those who are believed to be better informed even if that is not true. Despite the simplicity of the model, the equilibrium resulting from such behavior demonstrates the importance of examining how social interactions could influence agents in various outcomes and find a way to help agents rely more on a combination of own signals and information obtained by others' actions.

As mentioned, agents tend to use the information obtained via word of mouth communication to make decisions and thus, they tend to rely more on whatever information others' might exploit and less on personal studying and searching. In a related framework, Ellison et al. (1995) argue that such a reliance on word of mouth communication leads to identical aggregate behavior. Specifically, they test two hypotheses involving two competing products with different qualities and payoffs and then two equally good products and investigate whether agents choose the superior product in the first case and whether herd behavior is observed in the second one. Their findings suggest that word of mouth communication indeed reinforces similar behavior among individuals but as much as naive such behavior might seem, eventually leads to efficient social learning – selection of the on average superior product – when individuals share limited information.

2.2. Social interactions and general outcomes

Recently scientists paid a lot of attention to the theoretical and especially the empirical study of social interactions. There is a growing literature regarding the impact of social interactions on a variety of outcomes such as crime rates (Glaeser et al., 1996), disadvantaged youth (Case et al., 1991), and welfare participation (Bertrand et al., 2000). Glaeser et al. (1996) refer to the variance in crime rates across cities in the United States and support the existence of a significant effect of social interactions on these rates. The authors use an index of social interactions that is the proportion of potential criminals who are not influenced by social interactions and their analysis indicates that social interactions are highest in petty crimes and less while the severity of the crime increases. Case et al. (1991) support the existence of the impact of family members and neighborhood peers on disadvantaged youths mainly in variables related to drugs, alcohol, crime, church attendance and the propensity to be out of school or work. Bertrand et al. (2000) study the network effects on welfare participation using language spoken at

home as a method to infer networks and their empirical findings strongly support the importance of social interactions and contact availability in welfare participation.

2.3. Social interactions and financial decisions

A large body of the theoretical and empirical literature on social interactions refers to the impact of social networks on financial decisions. An important study is the one of Hong et al. (2004) which proposes that social households are more likely to invest in the stock market than non-social households while this influence being stronger in states where stock market participation rates are higher. Sociability is defined as the extent to which households interact with their neighbors or attend church. Using the Health and Retirement Study (HRS) data they indicate that sociability lowers the fixed costs of participation especially when participation rates among peers are higher, making the investment more attractive. The study indicates the presence of "social multiplier effects", i.e. the stock market participation rate among social investors may respond more sensitively in changes in other exogenous parameters. However, Hong et al. (2004) do not discriminate between the possible channels – word of mouth information sharing, observational learning or the pleasure from discussing about the market with other participants – through which social interaction may influence stock market participation. Liu et al. (2013) attempt to investigate two distinct channels (word of mouth communication and observational learning) through which social learning affects financial decision making, using data from stock market participation in China (stock account opening at the province level). As mentioned earlier, observational learning is a passive form of communication where individuals follow others' actions regarding financial decisions without any knowledge of their payoffs. On the contrary, word of mouth communication requires active interpersonal communication where individuals may acquire knowledge regarding payoffs and follow such kind of decision making based on them. This means that stockholding under observational learning is influenced by the number of participants in the stock market in the last period while under word of mouth communication by the difference between the current expected return and the historical high value. The authors acknowledge the importance of social interactions when studying the stockholding decisions and demonstrate the significance of the two distinct channels through which they operate. Stronger effects of observational learning arise positively with the level of social interactions, when they are measured by

passive communication, whereas the effects of word of mouth communication are increasing to the level of social interactions when they are measured by active communication.

Similar to Hong et al. (2004), Brown et al. (2004) use a large panel of tax returns based on IRS's annual sample of tax returns to investigate the presence of "community effect" on equity market participation where community is defined within a 50 miles radius around the household. They provide empirical evidence that an individual's own participation decision is more likely to be positively affected if more individuals in his local community are stock market investors while the effect is stronger for households that are less financially sophisticated. In addition, they find that households are more influenced by individuals with similar age and income status. Ivkovic et al. (2007) also provide strong evidence of a causal relationship between the decisions made by households regarding stock purchases and those made by their neighbors. They study the similarities in the investment choices of households and their neighbors – or as they call it information diffusion effects – using U.S. household data on stock purchases made through a large discount brokerage. Their analysis shows significant information diffusion effects or "neighborhood effects" which are even stronger for local purchases (compared to non-local ones) and for the more sociable states. The sensitivity of such investment choices is proved to be positively related to the population residing in the household's community. The findings of this study are in favor of the argument that word of mouth communication considerably influences the decisions made by individual investors as well as by mutual fund managers. Correlated preferences regarding investment choices and characteristics of the industry composition are split from the effects of word of mouth communication in two ways. First, the authors take into account the level of sociability in each state and conclude that the "neighborhood effect" is stronger in more sociable states, and second, they test for the rigidness of the information diffusion effect after controlling for the composition of the household's portfolio, the composition of the household's neighborhood portfolios, their reactions to past news as well as the industry composition. The persistent relationship between the stock purchases of households and that of their neighbors corroborates the word of mouth communication effect.

Similarly, Brown et al. (2008) segregate the channels through which social interaction influences stock market participation by investigating individuals' own participation decisions compared to their community's average stock market participation. Their findings suggest that word of mouth communi-

cation creates a causal community effect. Community is now defined as the Metropolitan Statistical Area (MSA) in which an individual resides and the authors instrument for the average participation of an individual's community with lagged average ownership of the states in which one's nonnative neighbors where born. They reinforce the already established positive relationship between individual's decision to participate in the stock market and the average stock market participation in his community and declare that these community effects influence individuals in the form of word of mouth communication. To verify this result, they apply an interaction term using the instrumented variable and a measure of sociability based on whether households ask their neighbors for advice and find that indeed word of mouth communication drives the causal effect since it is shown that in more sociable communities the community effect is stronger.

The effect of sociability is also studied by Georgarakos et al. (2011) who examine the effect of both sociability and trust in households' stock market participation and their importance regarding differences in stockholding across Europe. This work is in line with that of Guiso et al. (2008) who reveal a positive association between the prevailing level of trust and the stock market participation. Trust is defined as the subjective probability that individuals attribute to the possibility of being cheated which results from the objective characteristics of the market combined with the subjective characteristics of the other person. Demographic and education related characteristics play a determinant role in trust. Using Dutch and Italian micro data the authors document that high levels of mistrust could explain the observed limited stock ownership rates and point out the importance of proper information and education about stock market. Even in a very simple model where there are no costs in entering the stock market individuals might be discouraged by low trust levels.

Georgarakos et al. (2011) indicate that although the effect of trust is significant, sociability can partially balance the deterrent effect of low levels of prevailing trust on stock market participation. This study separates the significance of the effect of trust from that of the sociability and indicates the different channels through which they exert an impact on stockholding. Specifically, lower trust reduces the expected returns of an investment due to the additional probability of being cheated while sociability increases information sharing and reduces fixed participation costs. Using household level data from the Survey of Health, Ageing and Retirement (SHARE) in Europe and the World Value Survey, the authors demonstrate that the effect

of sociability is stronger in countries with higher rates of household participation while the effect of trust is significant in countries with lower rates of household participation and lower levels of trust.

The positive influence of social interactions on financial decision making corroborates the work of Liang et al. (2015). They investigate the effects of social interaction alone on the decision to participate in the stock market and then add the effects of internet access in this relationship. The study uses data from China Household Finance Survey that covers more than 8,000 Chinese households. They acknowledge the presence of the informational effect of social interactions which stems from communication with experienced friends and neighbors that share information about details of the stock market but there is also the social multiplier effect where individuals are affected by the average behavior of others in their community. The authors imply that information obtained through social interaction is not the sole information channel that might influence stockholding decisions. Their empirical results show that both information channels are significant and positively associated with stock market participation decision, but they substitute each other. Specifically, internet access is proved to mitigate the positive effects of social interactions as they show that marginal effects are lower if a household has access to the internet. Marginal effects of social interaction on stockholding decisions are also higher in communities where individuals participate more in the stock market which confirms the notion of social multiplier effects regarding social interactions.

Apart from studying the effect of social interaction in general, some studies try to assess the importance of the intensity of social interaction and the corresponding impact on stock market participation. Changwony et al. (2014) distinguish between strong ties and weak ties regarding the type of social interaction and attempt to test two hypotheses. First, whether the frequency in talking with neighbors (strong ties) is positively associated with the likelihood to participate in the stock market, and second whether participation in social groups (weak ties) is positively associated with the likelihood to participate in the stock market. These hypotheses are based on Granovetter's (2005) work which suggests that close friends tend to shape more similar ideas with an individual in contrast with his acquaintances. That is because acquaintances spend less time with that individual, move in different social circles and thus, acquire more novel information to share. On the other hand, close friends spend most of their time with the individual and are less likely to hold information not already acquired by him. This holds even though

close friends are more willing to help than the acquaintances. Changwony et al. (2014) use data from the British Household Panel Survey which contains information about individual and household socioeconomic variables. Consistent with Granovetter's (2005) propositions, the authors find that weak ties (i.e. social interactions) positively affect stock market participation decisions while strong ties exhibit no significant effect.

Another interesting study regarding the effects of social interactions on stock holding decisions is that of Li (2011) which uses as reference group extended families consisting of several households. The use of extended families helps overcoming the identification problem described by Manski (1993) and enriches the literature of social interactions deviating from the classical role of location. The paper investigates whether households are more likely to hold stocks if others from their extended family entered the stock market recently. This work also differentiates by studying the bilateral information sharing and influence between parents and children and more interestingly it exploits the existence of information sharing effects by examining the patterns of entries and exits among the members of the family. An investor's exit of the stock market is not supposed to have an impact on the exit of another investor and so, such a sequence of decisions observed within the extended families would favor the hypothesis of herding behavior. A sequence of decisions observed in entries in the stock market and not in exits favors the hypothesis of information sharing effects. The author uses data from the Panel Study of Income Dynamics to study such household decisions. The findings suggest that information sharing within extended families has a significant impact on the decision of an individual to invest in the stock market and the investor's probability to enter is higher if his parents or children entered the market in the previous five years. It is also suggested that this channel of social interactions works both ways between parents and children, and thus it supports the information sharing hypothesis. In contrast, the evidence does not support the herding behavior as similar patterns of behavior regarding stock market exits are not detected.

So far, the literature has dealt with the role of average decision making in a community and the respective decisions made by individuals, but it has not paid a lot of attention to the performance of the investors in the stock market. Kaustia (2012) studies whether the performance of other investors in the neighborhood affects the decision of an individual to enter the stock market. The data used cover the stock ownership and the transactions of the individual investors for the entire Finnish stock market and are derived

from the Finnish Central Securities Depository. The paper concludes that the returns that neighboring investors enjoy from the stock market in a given month encourage other individuals to invest in the stock market the following month. This effect is increasing to the number of investors in a neighborhood. However, this effect stands only for positive returns of the market which makes sense as people tend to avoid conversations about negative outcomes or bad performance. Thus, the results reinforce the importance of the type of social influence where positive returns create a positive influence for individuals to enter the market.

Apart from household investing, the literature identifies the importance of social interaction effects on investment decisions of professional investors. Hong et al. (2005) explore the stock holdings and trades among mutual fund managers and try to assess the implications of social interactions between them in a community. The database is comprised of data on mutual fund holdings from CDA Spectrum enriched with additional data sources. The basis of the strategy relies on the assumption that professional investors in an area are more likely to meet with other investors and have a direct contact in various occasions and thus, exchange ideas and information about investment decisions. Indeed, the results confirm the hypothesis as it is shown that stockholding and transactions of professional fund managers are sensitive to the holding decisions and transactions made by other fund managers in the same area. Although the results agree with the hypothesis of the word of mouth communication channel, the current investigation fails to reject the possibility that information about investment choices might be transmitted to fund managers through other channels such as newspaper or TV. In addition, the authors provide evidence that the similarities in managers' investment decisions are not governed by preferences in favor of the local stocks.

In a similar framework, Kedia et al. (2009) provide evidence of the impact of geographic location, measured using the MSAs as reference group, on a firm's rank and file option grants. Neighboring firms' decisions to grant more options affect positively other firms' choices and such social influence is higher if the workforce in the area is highly educated.

Despite the increased interest of the researchers to study social effects in the stock market, the social interaction literature also investigates their impact on individuals' decisions regarding retirement and savings. Duflo et al. (2002) deals with the potential association between individuals' retirement saving plans and the decisions of their peers. Particularly they study the role

of peer effects regarding Tax Deferred Account (TDA) participation and the choice of mutual fund vendor. TDA participation is considered complicated and individuals might not be able to distinguish among alternative saving plans and choose the most efficient one and thus, peers could constitute a very useful source of information on investment decisions. Apart from that, the already mentioned theory of Bernheim (1994) might lead the instincts of individuals who want to follow the social norms and end up choosing the same levels of consumption as does their social group. This paper focuses on the decisions made by the employees of a university (administrative and support staff). After analyzing the common econometric issues in the investigation of peer effects as mentioned by Manski (1993) the authors refer to their instrumental variable approach for the average participation in the plan using the distribution of wages in the department or the distribution of years of service. The results of this study propose an important influential effect of peer groups on the workers' TDA participation and other decisions related to the plan. However, it remains undetermined whether such behavior is driven by the influential role of information sharing which helps colleagues learn from each other or it is governed by the need to conform with the social norms prevailing in each worker's community. Evidence that helps to distinguish between these two channels would be useful for policy suggestions.

In a similar framework, Brown et al. (2012) study how peer influence may affect an individual's retirement decision and the causal relationship between his likelihood to retire and the number of colleagues retired in the previous year. This work, unlike earlier ones, provides evidence that coworkers' decision to retire affects the individual's retirement choice as well as the timing of this decision. The rationale behind the study of the potential effect is that retirement is considered as a complex financial decision and thus, peers could share information with each other or even imitate each other's behavior in order to make up their mind. In addition, individuals may find more appealing the decision to retire if their co-workers or friends are also retired. The paper examines this potential effect for all the retirement-eligible public-school teachers in Los Angeles. In order to deal with the common problems that arise when studying peer effects, the authors use as source of their instrumental variable strategy two pension reforms made in Los Angeles that created a shock in the retirement decisions of the teachers. The study concludes that an additional coworker retired in the previous year increases the likelihood of an individual to also retire and provide further evidence

that individual's decision is also influenced by the change in the financial situation of their retired peers. Moreover, the results indicate that a pension reform would affect retirement decisions of workers and this would in turn influence other workers' decisions that were not even directly affected by the reform. Thus, a pension reform that has not considered the peer influence would have larger effects than the expected.

The role of information shared by peers regarding savings decisions is studied by Beshears et al. (2015). They conduct a field experiment in a 401(k) plan that involved providing information about retirement savings decisions of a target population's peer group and try to conclude about the potential association between them. Surprisingly, the results of the experiment suggest that there might be an oppositional reaction to such information. Some individuals may be discouraged by the high saving rates of their peer group and eventually decrease their savings even more. This effect is observed in the group that consists of low-saving individuals.

Additionally, the literature deals with issues related to social networks and decisions about insurance products. Cai et al. (2015) conduct an experiment in rural China trying to assess the implications of social networks on the decisions of farmers to purchase a weather insurance product and propose the mechanism through which this influential effect operates. Specifically, the design of the experiment includes a concentrated dissemination of information to a subset of farmers and allows the authors to measure the spillover effects for the rest of the farmers that were not part of the information sessions. The farmers participating in the sessions are informed about an insurance product, how it works and the potential benefits. The experiment results demonstrate that farmers' decisions to purchase the insurance product is significantly and highly influenced by the farmers that were given the additional information sessions which provides helpful suggestions for a policy that intends to increase the adoption of innovative products. Moreover, an interesting part of the experimental approach of social networks is that the authors can propose the channel through which this spillover effect operates. As mentioned, the effect observed in the experiment is driven by the information sharing within the network about the characteristics of the insurance product as well as the benefits and not by the decision of their peers on whether to purchase or not. Thus, individuals are based on the knowledge acquired in order to decide and not just imitate their network's behavior.

Another topic of broad and recent interest related to social interaction ef-

fects deals with borrowing behavior. Individuals' decision to raise a consumer debt usually originates from the need to maintain a level of consumption that can preserve or communicate a certain social status. An eventually failed attempt can pose severe implications for someone's prosperity. Luttmer (2005) cope with the importance of relative standing among individuals and the potential effect on someone's well-being. It is suggested that individual's utility depends on the relative earnings of his neighbors. Using data from the National Survey of Families and Households (NSFH) regarding self-reported happiness and other subjective measures of well-being in addition to data regarding earnings from the Public Use Microdata Areas (PUMAs), the author shows that higher earnings in someone's neighborhood are associated with lower levels of happiness. This finding is stronger if someone socializes more with people in his neighborhood, but this does not hold for those who socialize with people outside the neighborhood. The author also claims that these results are not just driven by the way that individuals perceive happiness.

Regarding the debt literature, Becker et al. (2006) suggest that individuals competing for social status can eventually lead to suboptimal patterns of consumption. The status race guides individuals to excessive borrowing in order to purchase conspicuous goods. These goods, durable or not, are considered as an investment that helps individuals convey their social rank which is itself durable. Thus, from this perspective peer comparison operates in a negative way, creates nervous to individuals and impel them to debt raising.

Georgarakos et al. (2014) also empirically examine the role of social interactions on the borrowing decision of individuals. They concentrate on the hypothesis that a perceived higher income of an individual's social circle induces an increased debt raising and also study whether this effect leads individuals to borrow more than their resources and characteristics suggest and finally encounter financial distress. However, this investigation presents some challenges as households tend to conceal their debts and thus, individuals probably adjust their behavior based on their perception about their social circle while another challenge is the lack of location information. The authors use data from the Dutch National Bank Household Survey (DNBHS) which provides answers regarding the perceived average income of their acquaintances and their analysis focuses to the exogenous effects as mentioned by Manski (1993). The results indicate that individuals that see themselves as poorer from the average of their social circle tend to borrow more and this holds for different types of loans. In general, social comparisons not only

impact borrowing behavior but they also lead to loans that might not be repayable.

Aligned with Georgarakos et al. (2014), Berlemann et al. (2016) investigate whether an individual's decision to raise debt is associated with the average income in his area of residence. This study attempts to deal with the challenge of the scarcity of location information and for this it concentrates bank account data provided by a large German savings bank instead of survey data. Their results corroborate the findings of earlier studies as they demonstrate that individual's likelihood to participate in the debt market is positively related to the average income in his neighborhood. This effect holds for different types of loans such as collateralized, uncollateralized and overdraft facilities. So, the authors support that such debts might be used to finance the conspicuous consumption of individuals who want to display a specific social status.

2.4. Social interactions and economic attitude

An important part of the study of social interactions is the characteristics of the households that drive their economic behavior. For instance, the decision to participate in the stock market might also be affected by the risk aversion of each individual. Risk aversion is an important character trait and some studies find significant effects of social interactions on risk behavior. Ahern et al. (2014) study the effects of peer influence on risk aversion and trust using a panel survey of students of the University of Michigan that consists of all the incoming first-year students in the Day-MBA program of the Ross School of Business. The participants of the survey were asked several questions related to risk aversion and trust before the start of the academic year and a few months after the program begins and they were also randomly assigned to a peer group. Risk aversion was elicited using pairs of lotteries with different expected payoffs each time, and the participants are asked to choose between the two lotteries ten times. The measure of trust is calculated using a question from the World Value Survey that most studies use and is formulated as "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" and participants could respond, "Most people can be trusted," or "Can't be too careful." The results of the analysis indicate that peers influence risk aversion but not trust and specifically, if a student's peer group is on average highly risk averse then the student's risk aversion increases.

Another study regarding peer effects in risk taking is that of Lahno et al. (2015) that uses a controlled lab experiment in order to compare the two possible sources of peer effects in risk taking, envy and conformity. As it is stated, individuals may be influenced by the actions of their social circle, but this could stem from the interest in others' outcomes, others' choices or both. This experiment uses lotteries and two main treatments. In the first one, peers are randomly allocated a lottery and in the second peers must choose between the lotteries. The participants form groups of two and one of them is defined as the peer and the other one is the decision maker. The researchers study the actions of the decision maker conditional on the choices of the participant defined as peer. The analysis reveals significant peer effects among the participants and the effects are increasing when peers are choosing the lottery relative to when they are randomly allocated one, indicating that peers' choices play an important role in risky choices on top of payoffs.

A critical work on social interactions and economic behavior is that of Granovetter (2005) who focuses on the role of social networks on economic outcomes such as labor markets and productivity. He addresses that social networks affect economic outcomes because they have an impact on the flow and the quality of the information shared and because they can act as a source of reward or punishment for the decisions of other members in each network. With reference to labor markets, social networks affect the cost and benefits of searching employment as the flow of information regarding jobs, employers and employees in those networks is continuous. Social networks can also affect productivity by either cooperating with others or by observing others that maintain more knowledge. Even though productivity stems from personal traits, social groups may have a significant impact too.

3. The data

In order to study the effects of social interactions in the economic behavior of households we use survey data from the DNB Household Survey. This survey started in 1993 and is conducted annually by CentERdata at Tilburg University. The data are collected from almost 2000 Dutch households and the survey is representative of the Dutch-speaking population in the Netherlands. Our analysis pools data from the period 2010-2017. The survey consists of six questionnaires providing information about employment, pensions, accommodation, mortgages, income, assets, liabilities, health, perception of personal financial situation, perception of risks and general information re-

garding household characteristics. What is more useful about this database is that the respondents of the survey answer questions concerning their social circle (friends, neighbors, acquaintances, or co-workers).

The study of social interactions should be treated with caution as there are some problems arising when trying to infer endogenous effects. The term endogenous social effects describes the fact that an individual follows the average behavior of the individuals belonging in the same reference group as he does. Manski (1993) indicates that the difficulty in studying these social effects relies on the identification problem. He examines the "reflection" problem that arises when investigating the distribution of behavior in a population and investigates whether individuals' decisions in a particular group are affected by the average behavior in the same group. Similar behavior in a group can be explained by the following hypotheses. Endogenous effects imply that the behavior of an individual is influenced by the behavior of his reference group. Exogenous effects imply that individual's behavior is affected by the characteristics of his reference group and correlated effects imply that an individual's behavior is similar to that of others in his group because of similar individual characteristic and similar institutions. To study and infer on social effects is important to obtain additional information regarding the composition of each reference group, while more efficient investigation of social interactions should be based on tighter theory or richer data.

Another important problem arising when studying social interaction effects is defining the individuals' social circle and thus, many studies usually focus on geographic proximity or common working environment. The unique database of DNB Household Survey helps our study to overcome the problem of defining the households' social circle as the respondents are specifically asked to consider their peers and refer to their perceptions for some of their characteristics. Namely, they provide information about their perception of the average age, number of persons in each household, level of education, total net income, employment status, and hours worked per week by gender among the people in their social circle. Additionally, the survey asks about the most important source of information when individuals have to make an important financial decision and the respondents have to chooce between their parents, friends or acquaintances, newspapers, financial magazines, brochures from their banks or mortgage adviser, advertisements in the media, professional financial advisers, financial computer programms, financial information on the Internet or other sources. Table 3 presents the

definitions of these variables and their respective values in detail.

Another useful part of this database is that it also contains several questions related to economic attitude and financial decisions of the household members and thus, we are able to make assessments regarding the effects of social interactions on economic behavior. In order to make such assessements we estimate different models using several dependent variables. We follow the work of Renneboog et al. (2012) who use related variables to estimate the differences in the economic or financial behavior among religious and non-religious households. They state that there is a direct association between religion or religiosity and the economic attitude of households. In short, they show using the same survey data that religious households have stronger bequest motive and are more likely to save and that Catholics contrary to Protestants are more risk averse and thrifty. Related variables describing economic behavior are the main interest of our work. In order to estimate the association between social interactions and the locus of control of individuals we apply three different measures for this variable. The survey asks directly the respondents whether they agree with the statements that saving and careful investing is a key factor in becoming rich, or that their life is determined by their own actions, or that it is a matter of fate whether they become rich or poor. Other variables of interest in our anlysis refer to the risk aversion of households which is stated in the survey as whether 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 return, and the risks that the households took in the past few months. We also apply two different measures in order to assess the impact of social interactions on the bequest motive of households. So, we extract from the survey the variable indicating if it is importnant for the households to save money so as to leave a house or other valuable assets to their children and the one that gives the chance that they leave an inheritance to their children. A binary variable describing whether the households have put any money aside in the past 12 months is also available in our dataset and finally, we use a variable that contains the number of companies of which the households of the survey have stocks or shares. A more detailed description of the dependent variables examined here is given in Table 1.

Furthermore, our models contain numerous control variables describing households' characteristics that may affect individuals' economic and financial behavior according to the literature. Apart from a number of demographic variables such as age, gender, number of children, partner in the

household, province of residence, education and employment status, the survey provides with questions regarding households' total net income and the subjective general health condition of the respondents. The control variables referring to households' characteristics are thoroughly presented in Table 2.

Table 1: Definition of dependent variables

Variable	Description	Values
Locus01	'Saving and careful investing is a key factor in becoming rich'	totally disagree=1;...totally agree=7
Risk_aversion	'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'	totally disagree=1;...totally agree=7
Risks_taken	'How would you describe the risks that you have taken with investments over the past few years?'	I have taken no risk at all=1; I have taken small risks every now and then=2; I have taken some risks=3;I have sometimes taken great risks=4; I have often taken great risks=5
Locus07	' My life is determined by my own actions'	totally disagree=1;...totally agree=7
Locus12	It is chiefly a matter of fate whether I become rich or poor	totally disagree=1;...totally agree=7
Saving_for_inheritance	'How important is to you to have some money saved to leave a house and/or other valuable assets to your children?'	Very unimportant=1;...Very important=7
Bequest_motive	'What is the chance that you will leave an inheritance (including possessions and valuable items)?'	no chance=0;...absolutely sure=100
Savings	Did your household put any money aside in the past 12 months?	yes=1; no=2
Company_stocks	Number of companies of which you have stocks/shares	

Table 2: Definition of variables of households' characteristics

Variable	Description	Values
Age	Age of the respondent	
Gender	Gender of the respondent	Male=1; Female=2
Number_children	Number of children in the household	none=0; 1 child=1; 2 children=2; 3 children=3; 4 children=4; 5 children=5; 6 children=6; 7 children=7; 8 children=8; 9 children or more=9
Partner	Partner present in the household	no=0; yes=1
Health	General health condition	Excellent=1; Good=2; Fair=3; Not so good=4; Poor=5
Province	Province of residence	Groningen=20; Friesland=21; Drenthe=22; Overijssel=23; Flevoland24; Gelderland=25; Utrecht=26; Noord-Holland=27; Zuid-Holland=28; Zeeland=29; Noord-Brabant=30; Limburg=31
Education	Highest level of education completed	(continued) special education=1; primary education=2; pre-vocational education=3; pre-university education=4; senior vocational training or training through appren=5; vocational colleges=6; university education=7; did not have education (yet)=8; other sort of education/training=9
Occupation	Primary occupation	employed on a contractual basis=1; works in own business=2; free profession, freelance, self-employed=3; looking for work after having lost job=4; looking for first-time work=5; student=6; works in own household=7; retired=8; (partly) disabled=9; unpaid work, keeping benefit payments=10; works as a volunteer=11; other occupation=12; too young, has no occupation yet=13
Tot_net_income	'Into which of the categories mentioned below did the total net income of your household go in the past 12 months?	Less than 10,000 Euro=1; between 10,000 and 14,000 Euro=2; between 14,000 and 22,000 Euro=3; between 22,000 and 22,000 Euro=4; between 40,000 and 75,000 euro=5; 75,000 Euro or more=6

Table 3: Definition of variables of social circle's characteristics

Variable	Description	Values
Peer_income	'How much do you think is the average total net income per year of the households in your social circle?'	less than 8,000=1; between 8,000 and 9,500 Euro=2; between 9,500 and 11,000 Euro=3; between 11,000 and 13,000 Euro=4; between 13,000 and 16,000 Euro=5; between 16,000 and 20,000 Euro=6; between 20,000 and 28,000 Euro=7; between 28,000 and 38,000 Euro=8; between 38,000 and 50,000 Euro=9; between 50,000 and 75,000 Euro=10; 75,000 Euro or more=11
Peer_age	'Into which age category do most of the people in your circle of acquaintances go?'	under 16=1; 16 - 20=2; 21 - 25=3; 26 - 30=4; 31 - 35=5; 36 - 40=6; 41 - 45=7; 46 - 50=8; 51 - 55=9'; 56 - 60=10; 61 - 65=11; 66 - 70=12; 71 years or over=13
Peer_hh_persons	'Of how many persons do most households of your acquaintances consist?'	one person=1; two persons=2; three persons=3; four persons=4; five persons=5; six persons or more=6
Peer_education	'Which level of eduacation most of your acquaintances have?'	primary education=1; junior vocational training=2; lower secondary education=3; secondary education/pre-university education=4; senior vocational training=5; vocational colleges/first year university education=6; university education=7
Peer_employment	'What kind of employment do most of your acquaintances have?'	self-employed=1; practicing a free profession (freelance)=2; working in the family business=3; employed on a contractual basis=4; mostly no paid job=5
Men_hours_work	'If you think of the MEN among your acquaintances, how many hours per week do they work?'	
Women_hours_work	'If you think of the WOMEN among your acquaintances, how many hours per week do they work?'	
Financial_advice	'What is your most important source of advice when you have to make importnant financial decisions?'	parents, friends or acquaintances=1; information from the newspapers, financial magazines, guides, books, brochures from my bank or mortgage adviser, advertisemens on TV, in the papers or in other media, professional financial advisers, financial computer programs, financial information on the Internet, other=0

3.1. Descriptive Statistics

In this section we present a few summary statistics for the variables of interest. Table 4 presents the summary statistics concerning the dependent variables. For the Dutch households participating in the survey it is not clear whether they believe that saving and careful investing is a key factor in becoming rich as the mean value is 4.21. The variable describing risk aversion has mean value almost equal to 5 which indicates that most households think that 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 return, while in the quesion regarding the risks taken with investments in the past few years the majority of the households claims that they have taken small risks now and then. Most of the households moderately support that their life is determined by their own actions and it is not a matter of fate whether they become rich or poor. The respondents of the survey also find rather not so important to save money for a bequest while the mean value of the chance to leave an inheritance to the children is 67%. As presented in the table most households support that they saved some money in the past 12 months and the variable referring to the number of companies of which the respondents may have stocks or shares has a mean value of 0.27.

Table 4: Summary statistics for the dependent variables

	mean	sd	min	max
locus01	4.213911	1.536135	1	7
risk_aversion	4.98663	1.903867	1	7
risks_taken	2.117485	1.010182	1	5
locus07	4.880534	1.30077	1	7
locus12	3.080865	1.477453	1	7
saving_for_inheritance	3.460079	1.933946	1	7
bequest_motive	67.23566	36.98751	0	100
savings	1.304297	.4601249	1	2
company_stocks	.2779726	1.392302	0	50
N	15484			

In Table 5 we provide the summary statistics for the control variables used in our analysis. As presented the mean age of our samlpe is 54 years old, the

mean number of children in the household is 0.63, in most households there is a partner and most of the respondents characterize their general health condition as good.

Table 5: Summary statistics

	mean	sd	min	max
age	54.70253	15.36931	0	94
gender	1.26861	.4432502	1	2
number_children	.630807	1.015437	0	6
partner	.7051856	.4559733	0	1
health	2.169098	.7277974	1	5
province	26.64025	3.005482	20	31
financial_advice	.2357778	.424497	0	1
education	5.022602	1.504568	1	9
occupation	3.954833	3.460368	0	13
tot_net_income	3.843353	1.063359	1	6
peer_income	7.433564	2.073679	1	11
peer_age	8.661431	2.758281	1	13
peer_hh_persons	2.630806	1.007312	1	6
peer_education	4.932837	1.347411	1	7
peer_employment	3.960122	.9077391	1	5
men_hours_work	30.79756	15.90323	0	100
women_hours_work	21.37204	12.96222	0	100
N	16295			

Most interesting for our work is to examine the statistics regarding peers' characteristics. As respondents indicate most of their acquaintances are between 46 and 55 years old and they have average total net income between 20,000 and 38,000 euros per year. Most of the households of the respondents' social circle consist of 2 to 3 persons and most of them have senior vocational training. Referring to employment status most of the respondents' acquaintances are employed on a contractual basis and the working hours per week are 30 and 21 for men and women respectively. With reference to the most important source of advice regarding financial decisions we created a binary variable that takes the value 1 if the respondents think that their most important source of advice for financial matters are their parents, friends and

acquaintances. As presented in Table 5 the mean value for this variable is 0.23.

4. Econometric Specification

The purpose of this work is to examine whether the perception about average peer characteristics may influence households' economic behavior. Thus, following Georgarakos et al. (2014), we also assume that there are $g = 1, \ldots, G$ peer groups each containing $i = 1, \ldots, N_g$ households and our baseline model of estimation is expressed as:

$$y_{ig} = \beta_x x_{ig} + \gamma_x x_g + Z'_{1,ig}\beta + Z'_{2,g}\gamma + \epsilon_{ig},$$

where y_{ig} denotes either one of the categorical dependent variables describing economic behavior or a binary variable regarding savings or a continuous variable for bequest motive and company stocks. xig denotes household's own total net income while x_g is the perceived average income of the household's circle of acquaintances. $Z'_{1,ig}$ is a vector that contains household characteristics and $Z'_{2,g}$ is a vector that contains social circle's characteristics. ϵ_{ig} denotes the error term.

In order to estimate our models we apply different estimation methods. For the categorical variables of our study, the ones that the respondents are asked to answer on a scale from 1 to 7 (or 1 to 5), namely those describing the locus of control, the risk aversion or the risks taken, and the one refering to the bequest motive of the households we apply an ordered probit regression. For the binary variable of the study, the one describing whether the household saved any money or not over the past 12 months we apply a logistic regression and the models that estimate continuous variables, that is the chance to leave an inheritance and the number of companies of which households have stocks or shares are estimated with panel fixed effects.

5. Estimation Results

In this section we provide the estimation results for each one of the dependent variables of interest. In general, our results indicate a moderate effect of peers' characteristics on the economic behavior of households both in statistical significance and magnitude. Table 6 presents the estimation results for all the variables of interest while in Tables 7 to 11 we report the estimated

marginal effects for the dependent variables estimated with ordered probit regression models.

In respect to the variable that refers to the locus of control of the households, that is locus01, we find no statistically significant results for the variables related to peer effects. The results only indicate a negative association between the dependent variable and the number of children in the household and the general health condition. Specifically, the more children in the household or the worse the individuals think their health condition is, ceteris paribus, the less the households evaluate saving and careful investing as a character trait. However, this does not hold for the other two variables related to the locus of control of the households, namely the variables locus07 and locus12. The dependent variable locus07 that refers to whether individuals believe that their life is determined by their own actions, shows a statistically significant correlation with a few variables related to peer effects such as the average age of the people in the household's circle of acquaintances, the average number of persons in most of the households of their acquaintances, the kind of employment that most of their acquaintances have and the most important source of advice when they have to make significant financial desicions. Specifically, as presented in Table 9 that reports the estimated marginal effects for the outcome 1 (totally disagree), we find that these variables are statistically significant at the 10% level and at the 5% level for the variable related to peer employment. The estimated marginal effects indicate that individuals whose most important source of advice regarding financial matters are their parents, friends or acquaintances are by 0.04 p.p. more likely to totally disagree with the fact that their life is determined by their own actions. The same correlation holds for the average peer age, the average number of persons in most peers' households, and the average kind of peer employment with 0.016 p.p., 0.021 p.p., and 0.025 p.p. likelihood respectively. However, this measure of locus of control is not found to be associated with the perceived average peer income. The estimated results also support the existence of a negative correlation between a few demographic variables related to the gender of the respondent, the number of children in the household and the respondent's health condition with their belief on whether their life is determined by their own actions, while we also find that the provice where individuals live might significantly affect this dependent variable.

Table 6: Estimation Results

	Locus01	Risk aversion	Risks taken	Locus07	Locus12	Saving inheritance	Bequest motive	Saving	Stocks
peer_income	0.00811	0.0515***	0.0309**	-0.00683	-0.0156*	-0.0439***	1.080***	0.0271	-0.00605
	(0.95)	(6.63)	(2.39)	(-0.76)	(-1.77)	(-4.74)	(4.91)	(1.24)	(-1.02)
age	0.00191	0.000184	-0.00889	-0.00222	0.00238	-0.0108***	-1.845***	0.0164*	-0.0210***
	(0.54)	(0.06)	(-1.58)	(-0.57)	(0.64)	(-2.71)	(-8.70)	(1.91)	(-2.80)
gender	-0.0164	0.0363	-0.589***	-0.163**	-0.229***	-0.0367	-7.332**	-0.0260	-0.0867
	(-0.27)	(0.63)	(-5.45)	(-2.39)	(-3.57)	(-0.46)	(-2.40)	(-0.16)	(-1.54)
number_children	-0.0682**	-0.0166	-0.0719	-0.125***	-0.0166	0.120***	1.362	0.305***	0.0512
	(-2.27)	(-0.63)	(-1.55)	(-3.75)	(-0.53)	(3.51)	(1.10)	(4.01)	(1.16)
partner	0.0339	0.0876	-0.198**	0.0290	-0.0173	0.249***	1.367	-0.886***	-0.0190
	(0.56)	(1.55)	(-1.98)	(0.43)	(-0.27)	(3.07)	(0.54)	(-5.51)	(-0.26)
health	-0.0688**	0.00909	-0.0655	-0.135***	0.169***	0.00280	-0.456	0.392***	0.00739
	(-2.20)	(0.34)	(-1.46)	(-3.95)	(5.21)	(0.09)	(-0.55)	(5.34)	(0.27)
financial_advice	0.0107	0.0140	-0.302***	-0.105*	0.0967*	0.171***	-1.836*	0.144	-0.0502**
	(0.21)	(0.36)	(-4.28)	(-1.93)	(1.88)	(3.57)	(-1.68)	(1.30)	(-2.00)
province	-0.0103	0.0137*	-0.0321**	0.0171*	-0.00814	0.0118	1.496	0.0190	0.00114
	(-1.27)	(1.72)	(-2.19)	(1.87)	(-0.96)	(1.05)	(1.07)	(0.85)	(0.06)
education	0.0270	0.0254	0.0971***	-0.0142	-0.0331	-0.0442*	-1.090	-0.0374	0.0608*
	(1.39)	(1.39)	(2.98)	(-0.66)	(-1.64)	(-1.79)	(-0.93)	(-0.74)	(1.71)
occupation	-0.00545	0.000970	-0.00507	0.00373	0.000238	0.0234**	0.0645	0.0819***	-0.00262
	(-0.59)	(0.12)	(-0.36)	(0.37)	(0.02)	(2.19)	(0.21)	(3.68)	(-0.27)
tot_net_income	0.0235	0.00442	0.0113	0.0286	-0.0576***	0.0356*	-0.0296	-0.447***	0.0166
	(1.20)	(0.24)	(0.38)	(1.37)	(-2.86)	(1.67)	(-0.06)	(-9.24)	(0.89)
peer_age	-0.00805	0.00481	0.0297	-0.0437**	0.0269	0.0179	-0.705	0.0514	-0.00561
	(-0.43)	(0.32)	(1.12)	(-2.19)	(1.41)	(0.97)	(-1.40)	(1.21)	(-0.51)
peer_hh_persons	-0.0160	-0.0209	0.0518	-0.0566**	0.0582**	0.0489*	0.00954	-0.0637	-0.00348
	(-0.62)	(-1.01)	(1.50)	(-2.05)	(2.20)	(1.94)	(0.02)	(-1.09)	(-0.27)
peer_education	-0.0218	0.0156	0.0558*	0.0157	-0.0727***	0.0270	-0.160	0.0558	-0.00263
	(-1.08)	(0.93)	(1.93)	(0.72)	(-3.50)	(1.34)	(-0.33)	(1.20)	(-0.20)
peer_employment	-0.00725	0.00810	-0.0678**	-0.0650***	-0.00917	-0.00183	-0.568	-0.0389	-0.000172
	(-0.32)	(0.44)	(-2.40)	(-2.64)	(-0.39)	(-0.09)	(-1.33)	(-0.78)	(-0.01)
_cons							147.7***	-2.670***	1.314**
							(3.66)	(-3.25)	(2.13)
R-sqr							0.054		0.005
F-Statistics							16		1
dfres							2926.0		2683.0

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

In reference to the variable locus12 that describes individuals' opinion upon whether it is chiefly a matter of fate that they become rich or poor, we find some statistically significant peer effects. As reported in Table 10 where we present the estimated marginal effects for the outcome 1 (totally disagree), it is indicated that for higher perceived average peer income the households are by 0.2 p.p. more likely to disagree with the fact that fate defines their income status, which is also true for higher levels of their social circle's education, with estimated probability 1.19 p.p. However, individuals who find more important the financial advice given from their parents, friends and acquaintances and whose social circle's households are consisted of more persons, are more likely to state that fate determines whether they become rich or poor by 1.59 p.p. and 0.95 p.p. respectively. Regarding the demographic variables used in our analysis we find that women are less likely to disagree with the notion that it is a matter of fate that they become rich or poor which also holds for individuals with higher income, but we find that individuals with worse health status are more likely to disagree that fate plays such an important role in that matter.

Apart from studying the impact of social interactions on economic behavior related to the locul of control of individuals, we also examine this effect on their risk aversion. The results are supportive to the existence of some significant peer effects. In order to measure risk aversion we apply two different measures as mentioned above. In respect to the variable risk aversion that states whether individuals find more important to have safe investments and guaranteed returns, than to take a risk to have a chance to get the highest possible returns, we find that the perceived average peer income is significantly correlated to the risk aversion of the respondents. Specifically, as reported in Table 7, the estimated marginal effects for the outcome 1 (totally disagree) suggest that for higher perceived average peer income the individuals are by 0.33 p.p. less likely to be risk lovers. In addition this variable is statistically significant at the 1% level. Risk aversion is also found to be associated with the province where individuals live. The additional measure we apply in order to examine the effect of social interactions on risk behavior also present some statistically significant results. The estimations provided for the dependent variable risks taken that describes the risks that individuals have taken with investments over the past few years are presented in Table 8 where the marginal effects are estimated for the outcome 1 (no risk at all) and indicate that for higher perceived average peer income individuals are by 1 p.p. less likely to be risk averse while this variable is statistically

significant at the 5% level. In addition, the more the individuals take advice from their parents, friends and acquaintances for important financial desicions the more likely they are to be risk averse, with estimated probability 9.83 p.p. and statistical significance at the 1% level. Other peer characteristics that have a significant association with the risks that individuals have taken over the past few years are the average peer employment and the average level of peer education which indicates that for higher levels of peers' education the individuals are by 1.81 p.p. less likely to take no risk at all. Additional demographic characteristics related to individuals that are correlated with their risk behavior are the gender of the respondent, the presence of partner in the household, the province where they live and their level of education attained.

Another characteristic of individuals' economic behavior that is examined in our study is the one defining the motive of individuals to leave an inheritance while for this analysis we also apply two different measures. The variable named saving for inheritance that describes how important is for individuals to have some money saved to leave valuable assets to their children is correlated with a few peer characteristics. In particular, as reported in Table 11 where the marginal effects are estimated for the outcome 1 (very important), the higher the perceived average peer income is, the more likely are the individuals to evaluate as very important to save some money to leave an inheritance, with estimated probability 0.76 p.p. and statistical significance at the level 1%. However, the opposite effect holds for the variables defining the financial advice given from parents, friends and acquaintances and the average number of persons in the households of the individuals' social circle. As estimated the more the individuals evaluate their social circle's advice on financial desicions the less likely they are to save money to leave an inheritance, with estimated probability 2.97 p.p. while the higher the average number of persons in their peers' households the less likely they are to think that is important to save money to leave an inheritance, with estimated probability 0.85 p.p. The importance for individuals to save money to leave assets to their children is negatively correlated with the age of the respondents and their level of education attained while it is positively associated with the respondents' number of children, the existence of a partner in the household, their occupation and their total net income. The additional measure used in our analysis describing the motive to leave an inheritance is given by the variable named bequest motive which displays the chance that individuals will leave an inheritance. The results show that the age of the respondents

and their gender are both negatively associated with their bequest motive. At the same time, this dependent variable presents some significant peer effects since the perceived average peer income positively correlates with the chance that individuals leave an inheritance while the measure of the importance of the financial advice given from parents, friends and acquaintances is negatively associated with the respondents' bequest motive.

In regard to the variable describing whether households put any money aside in the past 12 months we find no significant peer effects but the analysis shows some significant results for a few demographic variables. Specifically, individuals' age, the number of children, their health and occupation status exhibit positive correlation with the dependent variable of interest while the existence of partner in the household and their total net income are negatively associated with their choice to save money.

The last variable of interest referring to the number of stocks/shares that the individuals have only presents significant negative correlation with the variable describing whether individuals evaluate as an important source of advice their parents, friends and acquaintances when they have to take important financial decisions. This finding is not in line with the proposition of Granovetter (2005) that indicates a positive correlation between strong ties and individuals' economic behavior. From the demographic variables used in our analysis, the age of the respondent and the level of education attained are significantly correlated with the number of stocks that individuals have. In particular, the higher the age of the respondents the less stocks/shares they own but the higher their level of education the more stocks/shares they have.

Table 7: Marginal Effects

	(Risk aversion)
peer_income	-0.00333***
	(-6.10)
N	8263

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Marginal Effects

	(Risks taken)
peer_income	-0.0101**
	(-2.40)
financial_advice	0.0983***
	(4.31)
peer_education	-0.0181*
	(-1.94)
peer_employment	0.0221**
	(2.40)
N	4345

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Marginal Effects

	(Locus07)
financial_advice	0.000404*
	(1.75)
peer_age	0.000169*
	(1.92)
peer_hh_persons	0.000219*
	(1.83)
peer_employment	0.000251**
	(2.21)
N	4319

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Marginal Effects

	(Locus12)
peer_income	0.00256*
	(1.76)
financial_advice	-0.0159*
	(-1.86)
peer_hh_persons	-0.00955**
	(-2.19)
peer_education	0.0119***
	(3.43)
N	4318

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Marginal Effects

	(Saving for inheritance)
peer_income	0.00763***
	(4.56)
financial_advice	-0.0297***
	(-3.50)
peer_hh_persons	-0.00851*
	(-1.93)
N	6583

t statistics in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

6. Conclusions

In our study we examine whether there is a significant correlation between social interactions and households' economic behavior using Dutch survey data from the DNB Household Survey covering the years 2010 to 2017. Specifically, we investigate the existence of significant peer effects on the locus of control of individuals, their risk aversion, their desicion to leave an inheritance, their savings and the stocks or shares that they have. We overcome the problem of inferring households' social circle as the respondents are asked to define their peers and provide some of their characteristics. After applying different regression models suitable for each one of the dependent variables of interest, our analysis offers some mixed results regarding peer effects.

In reference to the variables describing the locus of control of individuals we find that saving and careful investing desicions are not influenced by any peer characteristic, the compliance with the view that life is determined by one's actions is associated with a few peer characteristics and the estimation also shows a few significant peer effects regarding the variable that states whether it is a matter of fate that individuals become rich or poor. Most important is that we find that for higher average peer income, the individuals are more likely to disagree with the view that fate plays such an important

role. An intriguing result of our analysis is the one correlated to risk aversion variables. Specifically, we find a few significant peer effects for both variables but, the estimated signs are opposite indicating different effect on individuals' behavior while the average peer income increases. Concerning the variables related to individuals behavior upon inheritance our analysis exhibits a few significant peer effects while it is indicated that the increasing average peer income is associated with higher bequest motive for individuals. Finally, our analysis shows that the number of companies of which individuals have stocks/shares is negatively correlated with the financial advice given from their parents, friends and acquaintances, while we find no significant peer effect when it comes to the savings of the households for the past year.

In general, from the set of peer characteristics used in our analysis only a few exhibit significant effects and of moderate magnitude. Therefore, our findings are not very supportive to the existence of significant peer effects regarding households' economic and financial decisions.

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