Household Debt and Social Interactions[#]

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Abstract

Debt-induced crises, including the subprime, are usually attributed exclusively to supply-side factors. We examine the role of social influences on debt culture, emanating from perceived average income of peers. Utilizing unique information from a household survey representative of the Dutch population, that circumvents the issue of defining the social circle, we consider collateralized, consumer, and informal loans. We find robust social effects on borrowing, especially among those who consider themselves poorer than their peers; and on indebtedness, suggesting a link to financial distress. We employ a number of approaches to rule out spurious associations and to handle correlated effects.

Keywords: Household finance, household debt, social interactions, mortgages, consumer credit, informal loans.

JEL Classifications: G11, E21

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1. Introduction

The recent financial crisis has demonstrated the potential of sizeable household groups to borrow at levels that expose them to subsequent difficulties in servicing debts and to a non-trivial risk of default. For example, many US households had exposed themselves to excessive mortgage debt prior to the subprime crisis, and some ended up with negative equity following the reversal of historical house price trends. Existing literature and public discussion have paid attention, almost exclusively, to supply-side factors that may have contributed to this tendency, such as lax standards of the banking sector, the transfer of risks, and the resulting lack of discipline in applying sound banking standards.[1]

Much less attention has been devoted to understanding demand-side factors that contribute to the spread of debt culture, especially among households who perceive themselves as having fewer resources than their peers on average. An important example of such factors, albeit specific to the subprime crisis, is the subjective belief of borrowers that US house prices could not fall, based on the long historical experience of price increases.[2] Our paper focuses on another factor, which could apply to all types of debt and has been explored only in other contexts: comparison with peers. If expectations or perceptions of relative standing are important for debt behavior, then regulation and monitoring of financial institutions may need to be combined with measures for households, such as financial education, proper advice, and appropriate default options, in order to contain the spread of debt culture and the risks for future debt-induced financial crises.

The importance of relative standing in the social circle has long been recognized in the economics and finance literature, but for issues other than debt. Models with

[1] See for example, Mian and Sufi (2009) who show that a shift in credit supply was a key factor in the expansion of subprime mortgages in the US; and Demyanyk and Van Hemert (2012) who find that the quality of such loans deteriorated for six consecutive years prior to the crisis. Using recently available data, Christelis, Georgarakos and Haliassos (forthcoming) show that shortly prior to the recent crisis, outstanding mortgages were substantially larger among older US households than their European counterparts with similar resources and characteristics.

[2] See, for example, the contributions by Case (2012), Shiller (2012), and Smith (2012).

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interdependent preferences have been applied to consumption (Duesenberry, 1949; Abel, 1990; Gali, 1994, Kapteyn et al., 2011); asset pricing (Campbell and Cochrane, 1999); investing in assets (Duflo and Saez, 2002; Hong, Kubik and Stein, 2004; Kaustia and Knüpfer, forthcoming); supply of labor (Neumark and Postlewaite, 1998); work effort (Cohn et al., 2011); and short-run stabilization policy (Ljungqvist and Uhlig, 2000). To the best of our knowledge, this is the first paper that investigates the role of social interactions and comparison effects for borrowing behavior.

Our paper exploits unique features of a population-wide survey to uncover a statistically and economically significant influence of perceived relative standing on household debt behavior. Specifically, we employ data from the population-wide Dutch National Bank (DNB) Survey, and consider three different types of debt, namely collateralized loans, consumer non-collateralized loans, as well as informal loans from the social circle.

We find that the higher the average income in the social circle, as perceived by a household, the more this household tends to borrow, controlling for own demographics, resources, and other factors that typically determine borrowing needs. Estimated effects are sizeable both for collateralized and consumer debt. A 1,000 euro increase in the monthly household income of the peers is estimated to raise by 10 percent (7 percent) the unconditional likelihood of having collateralized (uncollateralized consumer) loans, respectively. Moreover, the influence of peer income on debt behavior is stronger among those who perceive their income to be below average for their social circle. Interestingly, higher perceived income of peers is associated not only with more borrowing but also with measures of household financial debt burden. As we discuss in detail later, we undertake a number of steps to rule out uninteresting alternative explanations of the relationship and to address the potential for a spurious correlation between the two due to similarity in

unobserved characteristics of the respondent or its environment with those of the peers. These latter steps include estimation of different instrumental variable regression models and application of placebo tests.

Uncovering effects of social interactions on borrowing behavior poses some special challenges, not necessarily present in other domains. First, information about characteristics of the social circle is not typically available in most wealth surveys, as they are subject to a high degree of anonymization, intended to prevent identity disclosure. Anonymization involves omitting or heavily restricting information on location in regions, let alone neighborhoods. Faced with this challenge, research on social interactions on the asset side attempts to identify peer effects by constructing hypothesized social circles based on sorting assumptions (e.g., age and education); or by focusing on specific financial products and social groups where interactions are visible (e.g., retirement plans in particular establishments); or by considering the frequency of meetings, where presumably assets (but typically not debts) are discussed or displayed.

The DNB Survey contains unique information that allows us to overcome this limitation. The survey asks respondents to describe key features of their social circle (e.g., age, education, occupation) and importantly the perceived average income of their peers. Moreover, the data offer information on the entire range of household debts, formal and informal, collateralized and unsecured, as well as on financial and real assets, as opposed to a single financial product. Finally, the survey is representative of the entire Dutch population, as opposed to a particular group.

An additional challenge is that, while households may derive some pleasure from revealing their wages, consumption or asset levels to their social circle (or may be unable to hide them), they tend to be quite averse to revealing debt levels, protected also by bank confidentiality. Thus, the important channel through which peer effects are likely to operate

is not direct observation and emulation of borrowing behavior among peers, but rather observation of some key determinant of such behavior (e.g., a measure of resources or ability to spend). In this context, we investigate the link between average peer income, as perceived by respondents, and the respondents' own borrowing behavior.

Our paper relates closely to three different strands of literature: effects of social interactions on asset choices; the relative income hypothesis and external habits; and finally, the literature on 'envy versus ambition'.

Duflo and Saez (2002) study library staff members in different libraries of a big American university and show that individual participation in retirement investment plans is influenced by participation choices of colleagues. Such endogenous social effects could come from learning about assets or from discovering relevant social norms, but it is difficult to distinguish between these two. Hong, Kubik and Stein (2004) focus instead on sociability, and show that the more sociable in terms of certain self-reported metrics (i.e., frequent communication with neighbors and church-going) are more likely to own stocks.[3]

The importance of peer income was stressed in the (cross-sectional) formulation of Duesenberry's (1949) relative income hypothesis, built on insights in Veblen (1899) and Smith (1759). According to this hypothesis, households with incomes below average in their social circle will tend to consume a larger share of their income to keep up with peers. In modern analysis of consumption and asset pricing, a fine distinction was made between dependence on contemporaneous average peer consumption ('keeping up with the Joneses') and lagged average consumption ('catching up with the Joneses').[4] Recently, Kapteyn et al. (2011) have examined the effects on consumption of winning a Dutch postal code lottery,

[3] Brown et al. (2008) identify a causal influence of sociability on stockholding by instrumenting the average stock ownership of an individual's community with past average ownership of the US states in which the individual's non-native neighbors were born. Georgarakos and Pasini (2011) document effects of sociability on stockholding in Europe.

[4] More recently, Roussanov (2010) built a model of status, where utility is a function of relative wealth and households are characterized by a desire to 'get ahead of the Joneses', focusing on private business ownership.

both among lottery winners and among their neighbors. Using specially collected survey data on expenditures and different assumptions on the social circle, the authors find that exogenous variations in income due to winning the lottery tend to influence durables purchases by winners but also the probability that neighbors will buy a new car. Their survey did not collect any information on debts or on perceptions of participants regarding their peers.

It should be stressed that the research question of social influences on debt is distinct from the one relating to consumption: even if concern with relative standing leads to greater consumption, it may not necessarily lead to a greater tendency to borrow. For instance, if households increase labor supply, relative income concerns can increase both consumption and saving. Indeed, Neumark and Postlewaite (1998) found that married women in the US are 16 to 25 percent more likely to work outside the home if their sisters' husbands earn more than their own husbands. Even a positive labor supply response, however, could imply either more or less saving/ borrowing.[5]

A third strand of literature has studied the link between relative income and self-reported happiness or general well-being. Relative income could measure relative deprivation, or create anticipatory feelings because lower-income households use it as a signal of the (higher) income they, too, can earn in the future. A number of studies have found that individual subjective well-being is negatively influenced by others' income[6], while utility-enhancing 'anticipatory feelings' (Caplin and Leahy, 2001) have been stressed by Hirschmann and Rothschild (1973), who dubbed them 'Tunnel Effect'. The idea is that, if

[5] Most existing theoretical models, based on an infinite-horizon representative agent, imply greater consumption, less leisure, and greater accumulation of assets, in order to keep up with the Joneses also in the future (Liu and Turnovsky, 2005). By contrast, Alvarez-Cuadrado and Van Long (2008) obtain less leisure but also lower saving when they consider overlapping generations in an infinite-horizon economy.

[6] For example, Clark and Oswald (1996) show that a worker's job satisfaction is negatively influenced by the income earned by other individuals in her reference group. Ferrer-i-Carbonell (2005) using German panel data finds that individuals tend to be better-off the larger their income is in comparison with the income of their acquaintances.

you are caught in a traffic jam in a tunnel and you see the other lane moving, you anticipate that you will also move soon.[7] The effect on borrowing may, in the end, be positive, either when households are disappointed by their current relative income or when they expect a positive income growth rate.

The rest of the paper is organized as follows. Section 2 describes the unique features of our data set. Section 3 discusses possible channels through which peers might influence borrowing behavior, and the econometric approach to address a number of challenges. Section 4 presents the main results on the relationship between perceived income of peers and own debt behavior, including endogeneity tests and IV estimates. Section 5 presents additional robustness checks and placebo tests. Section 6 presents evidence of asymmetric effects on borrowing across households poorer and richer than the peer average and inspects likely channels through which peer income operates. Section 7 concludes.

2. The Data

The DNB Survey is a unique data set that allows the study of both psychological and economic aspects of financial behavior. The survey was launched in 1993 and includes information on work, pensions, housing, mortgages, income, assets, consumer loans, health, economic and psychological concepts, and personal characteristics. The initial survey consists of around 2,790 Dutch households that are oversampled from the top-10% of the income distribution and (with the use of survey weights) is representative of the Dutch-speaking population. Households have been re-interviewed each following year, but given the length of the panel, attrition was non-negligible. In order to keep the cross section sample representative, new households have been added each year, with a major refreshing in 2001,

[7] Senik (2004) finds empirical support for the 'Tunnel Effect' using survey data from Russia, while Senik (2008) documents a negative comparison income effect in many 'old' European countries, and a positive one (i.e., consistent with a 'Tunnel Effect') in East European countries and the US, mainly linked to the degree of income mobility.

resulting in a sample of 1,861 households. In view of this significant refreshing, we pool data only from waves between 2001 until 2008, which cover a period of relatively stable employment rates and increasing housing prices[8], and we employ survey weights to account for the over-representation of the wealthy. After excluding households with incomplete questionnaires or missing information on the characteristics of their social circle, the sample used in the baseline estimations consists of roughly 4,500 households.

The survey includes an extensive questionnaire covering income, real and financial wealth holdings. Debt related questions allow us to distinguish between collateralized and non-collateralized debt as well as loans from friends and relatives. In what follows, we will mainly focus on consumer debt and collateralized debt, but we also present results on informal loans (from friends and relatives).

Table 1 provides summary statistics on the prevalence and the amounts outstanding among debt holders by survey year and by loan type. Reported statistics suggest relatively stable prevalence of all three types of loans over the years we examine. Collateralized debts account for most of household borrowing. They are held by roughly 40% of households and the median conditional outstanding amount is about 98,000 euro. One out of five Dutch households has consumer loans with a median outstanding amount of roughly 4,000 euro. On the other hand, 4% report loans from friends and relatives, while almost 28% report that they can borrow from friends in the future.

A unique feature of the Dutch survey, most relevant for our purposes in this paper, is that individuals are asked to report explicitly a number of characteristics of the people with whom they "associate frequently, such as friends, neighbors, acquaintances, or maybe people at work". In particular, respondents report their perception of the average annual total net household income among people in their social circle. Answers are recorded in one out of

[8] Unemployment rates in the Netherlands reach a minimum of 3% in 2008, while they increase to 3.7% and 4.5% in 2009 and 2010, respectively. National housing prices increase on average by roughly 2% each year up to 2008, while they decline by 2.8% in 2009 and by 3.4% in 2010.

eleven income brackets (details are provided in the appendix). Respondents also report the age category most members of their social circle belong to, the average household size, the average education, the most prevalent kind of employment in their social circle, and the average hours of work per week among peers, distinguished by gender.

Furthermore, the survey asks direct questions about the respondent's interactions with peers through financial information exchange or through informal borrowing; perceptions of the spending ability of the social circle; and expectations regarding future own income. This information is used below to shed light on the process through which social interactions influence borrowing behavior.

3. Effects of the Social Circle on Debt Behavior

3.1 Possible Channels

Asset market participation and holdings of peers may influence any member of the peer group via direct observation of financial behavior, information sharing, and dissemination of social norms. Peer effects in borrowing behavior, however, are much less likely to emanate from direct observation of the loans of peers or even from discussions with them regarding their indebtedness. Unlike assets, loans are not directly observable to third parties and can only become known to them if the borrowers decide to reveal them. Borrowers, on the other hand, are less likely to want to discuss their loans, because of embarrassment or shame, than to exhibit their assets.[9]

Still, financial advice and consultation with members of the social circle may inform households about the process of getting formal or informal loans, and/or about the social norms regarding borrowing; and may even deliver informal loans from the social circle. Our

[9] Such considerations have been shown to be important even in countries with underdeveloped credit markets, where informal borrowing is quite widespread. For example, Collins, et al. (2009), using data from Bangladesh, India, and South Africa, find that many indebted households feel ashamed asking relatives for additional credit or they do not wish to reveal their financial situation to close acquaintances.

data allow us to identify households that consult with their family, friends, and acquaintances regarding financial decisions and to take into account explicitly this possible channel of effects.

Households that do not consult with their social circle regarding financial matters may still be influenced by observable behavior of that circle in their decision on whether to take out a loan and how much to borrow. Through social interaction, households form a perception of the average disposable income of their acquaintances. This could come from a variety of sources, ranging from direct knowledge of pay scales for acquaintances at work to open discussions with friends and family, but also to inference of income levels from observed spending or asset accumulation patterns.[10] As discussed, a key feature of our dataset is that it asks respondents directly about the perceived average income of their acquaintances allowing us to assess its influence on own borrowing behavior.

It is conceivable that perceptions of higher peer income contribute positively to borrowing through at least three channels: trying to emulate the spending or living standards of acquaintances (a comparison effect); inferring that more can be borrowed directly from them in the future; and inferring that future own income is likely to move in the same direction as has current income of the social circle (an expectations or 'Tunnel' effect). Our survey allows us to take into account the second channel, by asking households directly whether they are in a position to borrow a significant amount of money from their friends and relatives; and the third, by asking them to state their expectations about future own income.

With reference to the first channel, spending behavior or visible accumulation of assets (such as housing) by members of the social circle may well induce a household to borrow in order to match it (or exceed it). Our data allow us to observe perceptions regarding spending ability of peers and to incorporate them in the econometric analysis. Although

[10] Indeed, imputation of incomes on the basis of spending items or asset accumulation is sometimes used by tax authorities to fight tax evasion in countries in which such phenomena are widespread.

perceptions regarding housing or living standards of peers are not directly available, we examine their relevance by imputing them based on data reported by households likely to be considered by the respondents as peers or as sharing key characteristics with them.

3.2 Econometric Specification

In the benchmark specification, we examine whether the tendency of households to borrow and the size of loans conditional on borrowing are influenced by the average income that they perceive their peer group to have. Specifically, respondents are asked the following question: "If you think of your circle of acquaintances, how much do you think is the average total net income per year of those households?" The possible answers come in brackets. In our reported results, we use the mid points of these bands, adjusted for inflation, while in the appendix we provide details on a number of robustness checks that employ different specifications of this variable.[11]

Existing literature on social interactions in consumption or asset holdings has focused on uncovering what Manski (1993) termed 'endogenous social effects', namely direct effects of observing the behavior of others, such as consumption or asset holdings, on own behavior.[12] Econometric modeling in this setup has to address the 'reflection problem' that naturally arises when the behavior of households in a group is expressed as a function of the average behavior of the group that includes them.

Given that debts are typically not observable by members of the social circle (for various reasons, discussed above), our primary focus is on uncovering 'exogenous or contextual effects'. These are influences on debt behavior that emanate from observing (or forming perceptions) regarding not debts, but key characteristics of peers relevant for debt

[11] We have experimented with dummy variables for income bands, and with a flag dummy variable for those answering 'don't know', but results are insensitive to these variations.
[12] See Durlauf and Ioannides (2010) for a thorough review of methodological issues in social interaction models.

behavior, such as peers' incomes. In this setup the two major challenges are: (i) to rule out spurious links between peer income and own borrowing behavior that have little to do with a comparison effect; and (ii) to rule out correlated effects, i.e. an association between own borrowing and peer income, arising from similarity in unobserved characteristics of the respondent or the respondent's environment with those of peers.

In our regressions, we control separately for non linear effects of household resources in the form of net income, net financial wealth, and net real wealth as well as for net income of the peers.[13] In addition, we take into account age (through a second order polynomial), gender, and educational attainment of the financial respondent as well as marital status and number of children.

A standard but uninteresting source of an effect of higher perceived income of peers on own borrowing could be related to an adverse idiosyncratic shock: controlling for own income, the higher the perceived average income of peers, the greater the chance that the household has experienced a bad idiosyncratic shock in this period. In such a case, standard models would prescribe more borrowing to smooth an adverse transitory shock. We control for this possibility by including in the regression self-reported health, labor market status dummies, and especially answers to a direct question on whether last year's income was 'unusually low'.

Another possibility is that the respondent's perception of higher income in the social circle partly reflects a macro or a regional shock: perceptions improve simply because the macro-economy performs better or because the region in which most of the social circle is located does so. We take into account these two channels in a flexible way by including both year and region fixed effects in all our specifications.

[13] We allow for non linear effects of household net income, financial and real wealth, and net income of peers (which all have skewed distributions) by means of the inverse hyperbolic sine (IHS) transformation (i.e., $\log(x+(x^2+1)^{1/2})$. The advantage of this, near-logarithmic transformation, is that it is defined for zero and negative values (see also Pence, 2006). Our results are robust to alternative specifications of the aforementioned covariates (e.g., dummies denoting quartiles).

The more involved potential channel whereby a positive association between peer income and borrowing could be generated is the one associated with correlated effects: there may be unobserved factors that influence both the desire to borrow and the desire to associate with high-income peers and acquaintances. In the case of informal loans, the link could be very direct: respondents would be more likely to associate with high-income peers and relatives in order to borrow from them. In the case of formal loans, the link could be subtler. For any given need to borrow, higher income friends would be able to provide more informal loans, reducing the need for formal ones. However, it may also be that unobserved factors make respondents more likely to borrow using any type of loan, and at the same time encourage them to associate with peers that are viewed as wealthy and in a position to provide informal loans. In this case, a spurious positive relationship between peer incomes and all types of loans might be generated.

One approach to address such problems of correlated effects is instrumental variable estimation. Instruments should be correlated with the covariate of interest (i.e., perceived average income of the social circle), and their effects on borrowing should run through peer income but not through other unobserved factors.

We use two independent sets of instruments that hinge on different identification assumptions. First, we exploit variation in local labor market conditions and the asymmetric effects that these can have for the incomes of households with different educational background. That is, a given difference in educational attainment between the respondent and her peers can imply a bigger difference in incomes in regions with better conditions for the highly educated workers. Specifically, we *interact* regional employment rates in high-tech sectors with the difference in educational attainment between each respondent and her peers, while we control for the respondent's own educational attainment and occupation status, as

well as for region fixed effects.[14] The identification assumption is that the educational gap between the respondent and her peers will raise the respondent's perception of her peers' average income, and more so when the regional employment share in high technology occupations, for which education matters a lot, is larger. Indeed results from the auxiliary regressions (presented in the Appendix, Table D.1, cols. 1, 2, 3) suggest a strong positive association between our instrument and the perceived income of the peers.

The second IV strategy follows the recent approach in network literature that exploits variation in characteristics of members of the social circle, not immediately linked to the decision maker (De Giorgi, Frederiksen and Pistaferri, 2011). In our data, members of a couple are asked separately to report the characteristics of their social circles, while we can distinguish in addition the person who ultimately makes the financial decisions. Thus, we use as an instrument for the financial decision maker's perceptions of his or her income of peers the characteristics of the *partner's* social circle, as reported by that partner. The idea is that the partner forms an estimate of average income in the social circle based on the characteristics of his/her own acquaintances (age and education), and this in turn influences the perception of the financial decision maker regarding average income in the decision maker's social circle. Such influence could be exerted either because the partner provides a fresh perspective and more information to the financial decision maker or because the partner exerts pressure and manages to alter the perceptions of the financial decision maker, even in ways that are not objectively accurate.

[14] High tech-sectors refer to both high-tech manufacturing industries (manufacture of basic pharmaceutical products and pharmaceutical preparations computer, electronic and optical products) and high-tech knowledge-intensive services (motion picture, video and television programs production, sound recording and music publishing activities; programming and broadcasting activities; telecommunications; computer programming; consultancy and related activities; information service activities; scientific research and development). We calculate employment rates in high-tech sectors across all Dutch provinces, namely: Groningen, Friesland, Drenthe, Overijssel, Flevoland, Gelderland, Utrecht, Noord-Holland, Zuid-Holland, Zeeland, Noord-Brabant, and Limburg.

In order to employ this instrument, we have to restrict the sample to couples. We take a cautious stance by considering only households for which the characteristics of peers reported differ among the financial decision maker and the partner. This may be due to small overlap between the social circles of the two partners, or to differences in perceptions of peers between them. Results from auxiliary regressions are presented in the Appendix (Table D.1, cols. 4, 5, 6). Given that we utilize two instruments (age and education) for one potentially endogenous covariate, we can assess their validity using a Sargan-Hansen test for over-identifying restrictions. As we show in the next section we fail to reject the null that the employed instruments are valid in all specifications used to model collateralized and consumer loans.

4. Results on the Role of Peer Income for Borrowing Behavior

We estimate a series of probit and tobit models, modeling the likelihood of having loans and the (log) amount of loans outstanding, respectively. Standard errors have been adjusted for heteroskedasticity, allowing for clustering at the household level. To gain understanding of the economic significance of our findings, we report average marginal effects for the probit models; and average marginal effects conditional on having the loan type under examination for the tobit models. We apply the two sets of instruments described above to all three different types of loans we consider: informal loans, collateralized formal loans, and consumer (uncollateralized) formal loans.

Table 2 (col. 1) presents average marginal effects from a probit regression modeling the probability that the respondent thinks that he/she can borrow from friends or relatives in the future, if needed. The estimated marginal effect of the perceived average income of the social circle is positive and significant at 1%. It implies that an assumed increase of the (perceived) annual household income of peers by 12,000 euro (i.e., 1,000 on a monthly basis)

is associated with a higher probability to declare that it is likely to borrow from the social circle in the future by 2.3 percentage points (pp). Both sets of instruments we employ are highly significant at 1% in auxiliary regressions, with F-tests well above 10. When we use either the first or the second set of instruments described above, we reject exogeneity at the 1% confidence level. As a result, we report marginal effects and associated standard errors on peers' income derived from two IV probit models.[15] In both cases, the estimated marginal effect is statistically significant and higher than the one derived under the simple probit model.[16]

When we examine the probability that respondents currently have informal loans, we also estimate a positive association with average peer income of the order of .8 pp (corresponding to an almost 20% increase in the unconditional probability of borrowing from friends), while we fail to reject the null of no endogeneity. Results from tobit regressions on outstanding informal loan amounts paint a similar picture.

Table 3 presents results for collateralized formal loans. In comparison to the specification used for informal loans we additionally control for intentions to borrow from friends in the future and for whether the respondent gets financial advice from friends and relatives. We do not find any significant association between own borrowing behavior and these last two covariates. If anything, results suggest a negative association (significant at 10% in the tobit specification) between getting advice from friends and outstanding levels of collateralized debt.

[15] Given that the original model is nonlinear with one (potentially) endogenous covariate that is continuous, we use standard maximum likelihood routines that fit discrete choice models with one endogenous covariate (e.g., ivprobit in Stata). They produce consistent estimated coefficients and associated standard errors that are necessary for the computation of marginal effects. An alternative way to test and correct for endogenous covariates in non-linear regression models is the two-step procedure of Rivers and Vuong (1988), summarized in Wooldridge (2002, p. 473). We have applied the Rivers-Vuong procedure, using both sets of instruments in all our models presented in Tables 2, 3, and 4, and the results are entirely consistent to those we present.

[16] While F-tests are passed for both instruments, the second instrument strategy fails the overidentification test.

We estimate statistically significant effects of the perceived average household income of the social circle (due to an assumed 12,000 euro annual increase) both on the likelihood to have a collateralized loan and on the (conditional) outstanding amount. The estimated marginal effect from probit is 4.4 pp, implying a more than 10% net contribution to the unconditional likelihood of having a mortgage. The estimated effect from tobit suggests a conditional elasticity of 0.5, corresponding roughly to a 15,500 euro increase in the amount borrowed by a typical household with collateralized debt.[17] According to all tests presented at the bottom of Table 3, we fail to reject the null of exogeneity of peer income, with p-values of the order of 15% - 17%. If one still estimates instrumental probit and tobit models, one derives qualitatively similar marginal effects using either set of instruments.[18]

Finally, Table 4 presents estimates relating to formal, uncollateralized consumer loans. We estimate a positive marginal effect of peer income on the probability that consumer loans are taken of the order of 1.6 pp (i.e., contributing about 7% to the likelihood of having such loans). The corresponding elasticity of the size of consumer loan, conditional on participation, to peer income is of the order of 0.24, which implies an increase of approximately 380 euro to the amount borrowed by a typical borrower.[19] Using either set of instruments we decisively fail to reject the null of exogeneity of income of peers in both probit and tobit models. Interestingly, getting financial advice from the social circle is negatively related to obtaining a consumer loan and to borrowing larger amounts conditional on obtaining the loan. It seems that financial advice from peers, instead of providing knowhow on how to obtain a formal consumer loan, tends to discourage respondents from obtaining such loans.

[17] The calculation is based on conditional medians of collateralized debt (98,000 euro) and of peers' income (34,500 euro) among households with collateral loans outstanding.

[18] The estimated marginal effects (p-values) from the instrumental variable probit models using the first and second set of instruments are 8.7 pp (.003) and 12 pp (.016), respectively. The corresponding estimated conditional elasticities from the instrumental variable tobit models are: .94 (.004) and 1.37 (.051).

[19] Based on conditional medians of uncollateralized debt (4,000 euro) and of peers' income (26,000 euro) among households with consumer loans.

5. Further Robustness and Placebo Tests

In what follows we investigate further the issue of endogenous peer income, exploiting the richness of the data rather than specific instruments and formal endogeneity tests. First, we consider the possibility that there are unobserved factors that systematically influence both the propensity to borrow and the association with more affluent peers. In such a case, it seems plausible that the perceived income of peers would have a stronger effect on borrowing among those who obtain financial advice from friends and/ or plan to borrow from them in the future. Respondents are asked precisely whether they obtain advice or plan to borrow from their peers, and their responses can be used to examine this possibility for formal loans.

We have re-estimated the models presented in Tables 3 and 4, introducing interaction terms between peer income and two dummies, representing households who obtain financial advice from friends and those who state that can borrow from friends in the future. In all models these two interaction terms were jointly insignificant.

Another approach to investigating the potential relevance of unobserved factors for the income of peers is to take into account the entire set of characteristics of peers asked in the survey. We have thus re-estimated the baseline models for formal loans (presented in Tables 3 and 4) including as additional covariates the age, education, household size, and employment status of the social circle. In all cases, the estimated effects on peer income in terms of magnitude, sign, and significance remained unchanged, while the additional characteristics of the social circle were mostly statistically insignificant.

A further possibility we want to guard against is that there are unobserved factors which influence both incomes and borrowing choices of people of similar age, education, and gender, and that these produce a spurious association between peer income and own borrowing. In order to rule out this possibility, we conduct a series of placebo tests for formal

loans. The idea is that, if such factors were important, then they would operate for any social circle sharing those characteristics and not only for the specific social circle of the respondent. To conduct the placebo test, we construct cells based on the interview year, age, education, and gender of participants; and we assign to each respondent in a given cell the acquaintances of another, randomly selected, respondent in that same cell.

Results from these placebo regressions for formal loans are summarized in Table 5. Unlike the income of the actual social circle of the respondent, the randomly assigned incomes of acquaintances are highly insignificant across all specifications (with p-values greater than .25 and in most of the cases well above .5). We have performed additional placebo tests based on cell construction that utilizes various combinations of the aforementioned traits and/ or regions that households live in. In all cases, we failed to estimate any significant effects on the (randomly assigned) incomes of acquaintances. Results from these placebo tests further support the view that the observed effects of average peer income reflect comparison effects rather than an artifact of the configuration of characteristics of social groups.

6. Inspecting the Nature of the Effects of Peer Income

It is plausible to suppose that effects of perceptions regarding the income of the social circle on loan behavior would depend on whether the own income is above or below that perceived level. In other words, we would expect that people who perceive themselves as being poorer than their peers would tend to be more responsive to changes in peer income than those who feel richer than their peers. We allow for such asymmetry by taking differences of own income from income of peers. That is, we re-estimate our baseline models (presented in Tables 2, 3, and 4) replacing peers' income with two terms denoting positive and negative differences between own and peers' income.

Results from this specification are presented in Table 6. For respondents who are poorer than what they perceive their acquaintances to be, an assumed increase in their social circle's annual income of 12,000 euro (that raises the income gap relative to their peers), increases the probability to get a collateralized loan by 3.6 pp and a consumer loan by 1 pp. In fact, only effects referring to those who perceive themselves as being poorer than their social circle are statistically significant, be it with respect to participation or to conditional amounts.[20]

Our results above suggest that the income of acquaintances and how it compares to the household's own income tend to influence borrowing, not only from friends and family but also from the financial sector. The increased tendency to obtain consumer loans and to make them larger conditional on getting them is presumably aimed at boosting consumer spending. The corresponding tendency for collateralized loans arises from efforts to acquire collateral assets of higher value. We look next for evidence that at least part of the peer income effect comes from a comparison with the ability of peers to spend, on consumer goods or on collateral assets.

For this purpose, we use a direct survey question on whether respondents perceive their acquaintances as having 'more money to spend' than they do. Responses to this question are coded in a one-to-seven ordinal scale, ranging from 'strongly disagree' to 'strongly agree'. This reference to 'money to spend' invites respondents to consider, in addition to incomes, also basic inelastic expenditure needs of their acquaintances (e.g., household size). The focus on others' spending ability allows us to see whether the intensity of such a perception has an independent influence on own borrowing behavior.

Table 7 (panel B) shows results on the ordinal variable denoting households' agreement with the statement that 'acquaintances have more money to spend than I' which

[20] The only exception regards the likelihood of borrowing from the social circle in the future, suggesting that households consider such a possibility even if their own income exceeds that of their peers and more so when their peers become richer, narrowing the income gap.

has been added to our baseline specification for non-collateralized consumer loans. In all cases, marginal effects are positive and statistically significant, both for participation and for conditional amounts.

In the case of collateral assets, such as the primary residence, ability of acquaintances to spend is indicated by the size and other observable attributes of the house they own. The dataset includes objective information on people's homes, including the size (in square meters) of the living room in the main residence. This size is readily observable to most of the social circle and likely reflects the household's standard of living and priorities in enjoying life.

As there is no direct information in the data on perceptions regarding the living arrangements of the social circle, we compute an average of square meters of the living room by age/education cells of the social circle of each respondent. We also take into account in the regression the square meters of the living room of the respondent, so that we estimate effects that are net of the respondent's own living standards.

Results on the covariates of interest are presented in Table 7 (panel A). The constructed variable on the average size of living rooms of the social circle is positive and statistically significant at 5%, both in the participation (probit) regression and in the conditional size of collateral loan (tobit) regression, controlling for the size of the respondent's own living room.

All in all, our results with proxies that refer to direct comparisons with spending or assets of members of the social circle support the hypothesis that the tendency of households to participate in collateralized and uncollateralized loans is partly influenced by such comparisons, controlling for the perceived average income of the social circle.

In trying to probe further into the nature of the comparison effect of average peer income, we also examine whether part of the effect is linked to the 'Tunnel Effect' (i.e.,

likely to arise because higher peer income signals the potential for higher own income in the future). To that effect, we have also taken into account the respondent's perception regarding the minimum possible income in the next year. We find that expectations about (minimum) income in the subsequent year has a positive and statistically significant coefficient in the regressions that model collateralized debt, supporting the presence of a 'Tunnel Effect' for this type of loans.

In sum, we estimate somewhat smaller, but still significant marginal effects of perceived average peer income on formal borrowing, even in the presence of such additional controls. This in turn suggests that the influence of peer income is not fully explained by a 'Tunnel Effect'. The remaining effects may well reflect some alternative considerations, like envy or concern about status, that are not fully captured by the proxies for comparison effects we have included in our regressions.

Finally, we examine the extent to which perceived income of the peers associates with measures of over-indebtedness. To this end, we regress loan-to-value ratios as well as debt-service ratios on perceived average income of peers and on the rich array of socio-economic covariates used in our baseline specifications. Average marginal effects from tobit regressions are presented in Table 8. Our estimates imply that an assumed 12,000 euro increase in the perceived annual income of the peers, contributes 1.2 pp to an average loan-to-value ratio of 18% and 0.3 pp to an average debt-service ratio of 6%. Endogeneity tests (summarized at the bottom of the table) show no evidence of endogenous peer income in either of the equations.[21]

These findings suggest that the effect of social interactions we uncover is not confined to own borrowing behavior, but is also likely to have implications for financial distress. In the country and time period considered, there was an upward trend in housing prices and

[21] Calculations are a based on a median peer income of 33,000 euro.

relatively stable labor market conditions. Nevertheless, factors like perceived income of the peers that have induced additional borrowing during times of expansion could well turn into key determinants of distress during recessions. Indeed, if such reversals are present, it may be worthwhile to extend the logic of 'Minsky moments' to household borrowing, as well.

7. Concluding Remarks

In this paper, we use unique information from the DNB Household Survey, representative of the Dutch population, in order to assess the effects of social interactions on the tendency to have debt of different types and on the size of loans conditional on having them. We exploit the directly elicited perceptions of respondents regarding the average income of their social circle and ability of their peers to spend. This circumvents the need to construct a hypothesized social circle on the basis of arbitrary assumptions regarding characteristics of its members.

We find that the higher the perceived income of the social circle is, the greater is the tendency of respondents to take up loans and borrow sizeable amounts. This is true both for uncollateralized (consumer) loans and for collateralized loans, controlling for a number of factors that include household own resources, whether the household obtains financial advice from its circle, and whether it thinks that it could borrow substantial amounts from them. The effect is stronger for those who perceive themselves as having lower income than their social circle.

The tendency of households to take up uncollateralized and collateralized loans, controlling for the perceived average income of the social circle, is partly related to perceived spending ability or (computed) housing assets of members of the social circle. Moreover, we find that expectations about (the minimum) next period's income are statistically significant for collateralized loans, pointing to a 'Tunnel Effect', but do not render perceived income of

the peers insignificant. This is consistent with the idea that borrowing behavior is influenced by peer income not only because it conveys some information regarding the respondent's own future, but also because of some comparison or envy effect. Finally, the role of such comparisons is not confined to the tendency to borrow and to the level of borrowing conditional on participation, but it seems to extend also to financial distress.

The potential for social influences on borrowing is considerable: by observing that others have higher average incomes, the household not only tries to emulate their spending, as other studies have found, but also decides to borrow more, only partly because of expectations of higher future own income. To the extent that such mechanisms are present, they can contribute to 'Minsky moments' that involve not only excessive borrowing by companies during booms, emphasized by Minsky, but also excessive borrowing by households. The policy implication of such findings is to interfere not with the process of forming social circles or perceptions regarding them, but rather with households inferring that income or spending differences with their peers are to be bridged through borrowing, especially when this is not supported by the economic fundamentals of the household.

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Appendix A. Definitions of Variables and Summary Statistics

Types of Debt:

Ability to borrow from social circle. Yes to "Are you currently in a position to borrow a substantial sum of money from family or friends?" (LENEN=1)

Loans from social circle: Loans from family and friends.

Collateralized loans: Debts on hire-purchase contracts; debts based on payment by installment; equity based loans; debts with mail-order firms; shops or other retail business; mortgages on main house, second house and other pieces of real estate.

Outstanding uncollateralized debt: Private loans; extended lines of credit; study loans; credit card debts; other loans.

Questions on characteristics of the social circle:

The following questions concern your circle of acquaintances, that is, the people with whom you associate frequently, such as friends, neighbors, acquaintances, or maybe people at work.

KENLTD. If you think of your circle of acquaintances, into which age category do MOST of these people go? Please select the answer that is closest to reality. Age (in years) is mostly: under 16; 16 – 20; 21 - 25; 26 - 30; 31 - 35; 36 - 40; 41 - 45; 46 - 50; 51 - 55; 56 - 60; 61 - 65; 66 - 70; 71 or over.

KENHH. The people in your circle of acquaintances may live alone or share a household with other people (for example with a partner and children). Of how many persons do MOST households of your acquaintances consist? one person; two persons; three persons; four persons; five persons; six persons or more.

KENINK. How much do you think is the AVERAGE total net income per year of those households? less than € 8,000 per year; € 8,000 – 9,500; € 9,500 – 11,000; € 11,000 – 13,000; € 13,000 – 16,000; € 16,000 – 20,000; € 20,000 – 28,000; € 28,000 – 38,000; € 38,000 – 50,000; € 50,000 – 75,000; € 75,000 or more; don't know.

KENOPL. Which level of education do MOST of your acquaintances have? primary education; junior vocational training; lower secondary education; secondary education/pre-university education; senior vocational training; vocational colleges/first year university education; university education.

KENWERK. What kind of employment do MOST of your acquaintances have? self-employed; practicing a free profession; working in the family business; employed on a contractual basis; mostly no paid job.

MANUUR (VROUWUUR). If you think of the MEN (WOMEN) among your acquaintances, how many hours per week do they work on average?

Other questions:

Get financial advice from friends. When answering "parents, friends or acquaintances" to the following question: "What is your most important source of advice when you have to make important financial decisions for the household?" (ADVIES=1).

Social circle has more money to spend than I. "Other people in my environment have more money to spend than I. Please indicate to what extent you agree or disagree" (SITUAT3: 1.totally disagree…7.totally agree).

Last year income: unusually low. "Is the income your household earned in the past 12 months unusually high or low compared to the income you would expect in a 'regular' year, or is it regular?" (INKNORM= 1."Unusually low").

Perceived lower bound on next period's income. "What do you expect to be the LOWEST total net monthly income your household may realize in the next 12 months? (HOOG).

Table A1. Summary statistics: various demographics

Variable	Average	Std. Dev.	Number of Observations
Age	48.23	15.41	14,893
Male	0.53	0.50	14,892
Couple	0.64	0.48	14,893
Number of Children	0.64	1.03	14,893
Education dummies:			
Less than high school	0.27	0.44	14,815
High School	0.34	0.48	14,815
College Degree	0.38	0.48	14,815
Other Education	0.01	0.11	14,815
Labour market status dummies:			
Unemployed	0.02	0.14	14,889
Employed	0.54	0.50	14,889
Self employed	0.04	0.20	14,889
Retired	0.17	0.37	14,889
Other status	0.23	0.42	14,889
Last year income: unusually low	0.07	0.25	11,342
Health poor/ fair	0.28	0.45	11,791
Ability to borrow from soc. circle	0.28	0.45	8,782
Get financial advice from friends	0.34	0.47	11,454
Soc. circle has more money to spend than I	3.85	1.47	8,939
Own living room sq. meters	35.98	25.26	12,013
Avg living room sq. meters of friends	36.54	3.37	14,892
Loan-to-value ratio	0.18	0.30	13,081
Debt servicing ratio	0.06	0.15	10,215

Note: Weighted statistics from waves 2001-2008 of DNB data.

Table A2. Summary statistics: various economic indicators

Variable	Average	Std. Dev.	25th perc	Median	75th perc	Number of obs
Avg. peer income	31,807	13,955	24,000	33,000	36,941	6,872
Net hh income	27,617	23,638	15,943	24,687	35,886	10,031
Net financial wealth	36,137	100,092	1,393	10,847	36,430	11,412
Net real wealth	102,417	179,408	0	11,913	163,576	13,245
Perceived lower bound on next period's income	17,500	36,683	2,134	14,434	26,387	11,049

Note: Weighted statistics from waves 2001-2008 of DNB data. Amounts refer to constant 2008 euro.

Appendix B. Calculation of average marginal effects via Monte Carlo simulation

Given that marginal effects are non-linear functions of the estimated parameters, $\hat{\beta}$ (either from probit or tobit models), we compute their point estimates and standard errors via Monte Carlo simulation (Train, 2003) by using the formula:

$$E(g(\beta)) = \int g(\beta) f(\beta) d\beta$$

where $g(\beta)$ denotes the magnitude of interest and $f(\beta)$ the joint distribution of all the elements in β. We implement this simulation estimator by drawing 500 times from the joint distribution of the estimated vector of parameters $\hat{\beta}$ under the assumption that it is asymptotically normal with mean and variance-covariance matrix equal to the maximum likelihood estimates. Then, for a given parameter draw j we generate the magnitude of interest $g(\hat{\beta}^j)$. We first calculate this magnitude for each household in our sample, and then calculate the average marginal effect as the weighted average of the effect across all households in our sample, using survey weights.[22] We then estimate $E(g(\beta))$ and its standard error as the mean and standard deviation, respectively, of the distribution of $g(\hat{\beta}^j)$ over all parameter draws. Details on the formulae used to derive unconditional and conditional marginal effects after the tobit estimation can be found in Green (2000, Chapter 22).

[22] We do not evaluate marginal effects at sample means since this practice can lead to severely misleading results (see Train, 2003, pp. 33-34).

Appendix C. Further Robustness Checks

We performed a number of checks in addition to those presented in the main text in order to ensure the consistency of our findings. First, about twenty percent of households answer "don't know" to the question regarding the perceived average income of their peers and thus they are not used in our baseline regressions. To examine the sensitivity of our findings to the inclusion of these missing observations we have re-estimated all our baseline models presented in Tables 2, 3, and 4 and add a flag dummy to denote households answering that they do not know the income of their peers. For these observations the missing income of the peers is replaced by zeros. Estimated average marginal effects and associated standard errors for the income of the peers from this larger sample of households are presented in Table C.1. Notably, the estimated magnitudes across all specifications are very similar to those we estimate in our baseline models.

Second, we experimented with different specifications that employ quartiles to model the income of the peers and our results are robust to such transformations. Our results are also insensitive to functional forms that use quartiles to model own income and/ or own financial and real wealth.

Third, our modeling strategy of borrowing behavior is quite standard in household finance literature and it is in line with life-cycle portfolio models in which households decide each single period for the allocation of their resources and the amount of borrowing. Yet, one may argue that for many households that are observed in the data with collateralized loans outstanding in a given period, the decision to take up such loans (especially mortgages) is quite binding and has been typically made many years prior to the interview. To examine the sensitivity of our results to this issue, we have re-estimated our probit model for collateralized loans focusing only on households that take up such loans (i.e., switch borrowing status) during the period covered by our data. Specifically, we use the sample of households without collateralized loans in 2001 (i.e., the initial observation period in our sample) and estimate the probability of taking up such a loan in any of the subsequent seven waves. This probit model conditions on the same set of covariates as the one used in our baseline specification (presented in Table 3). The estimated marginal effect on the income of the peers is 2 pp, significant at 1%, and contributes almost 20% to the unconditional probability of taking up a collateralized loan in this sample. Thus, estimated effects on the

income of the peers from this ‘inflow’ sample are economically important and relatively stronger to those we derive in our baseline specification.

Fourth, one might argue that the estimated effects of income of the peers on collateralized loans are partly due to expectations about future housing market conditions. To that effect, we have estimated specifications of collateralized debt behavior that take into account, apart from peers’ income and expectations about next year’s own income, various expectations regarding future conditions in housing and mortgage markets. In particular, we take into account whether respondents expect housing prices to go up, whether they anticipate an increase in mortgage interest rates, and whether they think that tax deductibility of mortgage interest rates will be limited in the future. Results (available upon request) suggest a significant negative relationship between an expected increase in mortgage interest rates and collateralized debt, but they do not affect our baseline findings regarding the significant role of income of peers or of expectations about next year’s own income (shown in Table 7, panel A).

Table C.1. Effects of Peer Income (taking into account 'do not know' responses).

	Pr(perceived ability to borrow from social circle in the future>0)		Pr(Loans from social circle>0)		E(log(Loans from social circle))|Loans from social circle>0	
Panel A. Loans from Social Circle						
	Marg. Eff.	**std. error**	**Marg. Eff.**	**std. error**	**Marg. Eff.**	**std. error**
IHS(avg. peer income)	0.0256	0.0075 ***	0.0090	0.0039 **	0.2796	0.1129 **
Log likelihood	-3,414.9		-1,049.6		-1,892.7	
Number of Observations	6,375		7,405		7,405	
Panel B. Collateralized Loans						
			Pr(Collateralized Loans>0)		**E(log(Colat. Loans))|Colat. Loans>0**	
			Marg. Eff.	**std. error**	**Marg. Eff.**	**std. error**
IHS(avg. peer income)			0.0416	0.0081 ***	0.4713	0.0827 ***
Log likelihood			-3,799.9		-14,480.5	
Number of Observations			6,373		6,373	
Panel C. Consumer Loans						
			Pr(Consumer Loans>0)		**E(log(Cons. Loans))|Cons. Loans>0**	
			Marg. Eff.	**std. error**	**Marg. Eff.**	**std. error**
IHS(avg. peer income)			0.0157	0.0056 ***	0.2307	0.0792 ***
Log likelihood			-2,408.1		-7,679.6	
Number of Observations			6,373		6,373	

Note: Selected marginal effects from probit regressions modeling the probability of having a loan and marginal effects from tobit regressions on the log amount of the loan outstanding conditional on having such loan. Reported marginal effects are based on a 12,000 euro annual increase of peer income. Specifications in panels A, B, and C condition on the same set of covariates used in the baseline specifications in Tables 2, 3, and 4, respectively, and a flag dummy denoting households that answer 'do not know' to the peer income question. Standard errors are corrected for heteroscedasticity and clustered at the household level. ***,**,* denote significance at 1%, 5% and 10% respectively.

Table D.1: Auxiliary Regressions

	IV 1						IV 2					
	(1)		(2)		(3)		(4)		(5)		(6)	
Age	0.0219	0.0041 ***	0.0217	0.0039 ***	0.0228	0.0042 ***	0.0164	0.0074 **	0.0187	0.0070 ***	0.0171	0.0074 **
Age^2	-0.0002	0.0000 ***	-0.0002	0.0000 ***	-0.0002	0.0000 ***	-0.0002	0.0001 **	-0.0002	0.0001 **	-0.0002	0.0001 **
Male	-0.0162	0.0192	-0.0260	0.0182	-0.0177	0.0191	0.0434	0.0306	0.0217	0.0281	0.0404	0.0307
Couple	0.1841	0.0198 ***	0.1832	0.0191 ***	0.1824	0.0197 ***	-		-		-	
Numb of Children	0.0102	0.0081	0.0125	0.0078	0.0104	0.0081	0.0131	0.0117	0.0154	0.0111	0.0124	0.0119
High School Education	0.2441	0.0232 ***	0.2469	0.0223 ***	0.2411	0.0234 ***	0.0853	0.0333 **	0.0802	0.0315 **	0.0836	0.0336 **
College Degree	0.4321	0.0255 ***	0.4353	0.0245 ***	0.4275	0.0257 ***	0.1218	0.0357 ***	0.1169	0.0333 ***	0.1215	0.0359 ***
Other Education	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2069	0.0950 **	0.0000	0.0000	0.1966	0.0968 **
Employed	0.1141	0.0261 ***	0.1253	0.0246 ***	0.1145	0.0261 ***	0.0655	0.0366 *	0.0787	0.0339 **	0.0631	0.0367 *
Self employed	0.1137	0.0574 **	0.1102	0.0541 **	0.1126	0.0574 **	0.0554	0.0822	0.0844	0.0758	0.0599	0.0827
Retired	0.0653	0.0310 **	0.0689	0.0285 **	0.0672	0.0312 **	0.0214	0.0505	0.0360	0.0461	0.0240	0.0510
Unemployed	0.1255	0.0617 **	0.1196	0.0604 **	0.1289	0.0619 **	0.1270	0.0866	0.1295	0.0814	0.1255	0.0873
Last year income: unusually low	-0.1352	0.0331 ***	-0.1289	0.0315 ***	-0.1330	0.0331 ***	-0.1350	0.0558 **	-0.1365	0.0487 ***	-0.1321	0.0555 **
Health poor/ fair	-0.0272	0.0170	-0.0207	0.0160	-0.0258	0.0169	-0.0323	0.0248	-0.0324	0.0235	-0.0312	0.0247
IHS(net hh income)	0.0149	0.0029 ***	0.0129	0.0026 ***	0.0147	0.0029 ***	0.0176	0.0058 ***	0.0174	0.0053 ***	0.0177	0.0059 ***
IHS(net fin wealth)	0.0031	0.0011 ***	0.0028	0.0011 ***	0.0029	0.0011 ***	0.0045	0.0018 **	0.0048	0.0017 ***	0.0045	0.0018 **
IHS(net real wealth)	0.0067	0.0017 ***	0.0074	0.0016 ***	0.0066	0.0017 ***	0.0062	0.0028 **	0.0063	0.0025 **	0.0063	0.0028 **
Percv. ability to borrow from social circle in the future	-		-		0.0324	0.0159 **	-		-		0.0368	0.0249
Get advice from soc. circle	-		-		-0.0014	0.0150	-		-		0.0120	0.0236
Regional dummies	yes		yes		yes		yes		yes		yes	
Year dummies	yes		yes		yes		yes		yes		yes	
Constant	9.7130	0.1136 ***	9.7379	0.1075 ***	9.6834	0.1165 ***	9.6186	0.2043 ***	9.5818	0.1937 ***	9.5922	0.2065 ***
(avg. peer Educat. - own Educat.)*Regional empl. % in h tech	0.0380	0.0026 ***	0.0390	0.0025 ***	0.0377	0.0026 ***						
avg. peer Age (non fin. resp.)							0.0037	0.0020 *	0.0031	0.0019	0.0037	0.0020 *
avg. peer Education (non fin. resp.)							0.0381	0.0056 ***	0.0379	0.0053 ***	0.0372	0.0056 ***
F-statistic - instruments *(p-value)*	208.68	*0.00* ***	250.80	*0.00* ***	205.48	*0.00* ***	23.65	*0.00* ***	25.82	*0.00* ***	22.69	*0.00* ***
Number of Observations	4,363		4,899		4,362		1,339		1,545		1,339	

Table 1. Prevalence and Amount of Borrowing by Loan type

Year	Perceived ability to borrow from social circle in the future (%)	*Prevalence (%)*	Conditional amounts outstanding			
			Average	25th perc	Median	75th perc
Panel A. Loans from Social Circle						
2001	30.45%	*4.87%*	15,212	1,583	2,771	15,832
2002	32.24%	*4.96%*	13,582	2,279	5,065	12,662
2003	29.68%	*4.26%*	12,010	1,391	3,241	15,689
2004	25.80%	*3.92%*	10,207	1,058	3,704	10,783
2005	28.12%	*4.47%*	7,976	1,098	2,196	7,320
2006	27.55%	*3.73%*	7,650	1,439	3,085	7,197
2007	25.99%	*3.72%*	8,488	1,829	3,810	7,112
2008	28.10%	*3.49%*	9,422	1,500	3,000	7,900
Total	28.31%	*4.16%*	10,638	1,519	3,313	10,282
Panel B. Collateralized Loans						
		Prevalence (%)	Conditional amounts outstanding			
			Average	25th perc	Median	75th perc
2001		*37.81%*	105,038	44,857	83,118	131,934
2002		*43.22%*	113,177	45,760	89,288	139,512
2003		*43.12%*	113,921	44,298	90,757	146,940
2004		*40.96%*	110,673	46,562	92,065	145,405
2005		*41.25%*	118,971	51,238	100,384	156,851
2006		*40.69%*	117,246	49,353	100,763	159,370
2007		*41.02%*	132,048	59,944	111,760	181,864
2008		*40.92%*	132,920	61,750	120,000	180,000
Total		*41.15%*	117,926	48,620	98,293	156,664
Panel C. Consumer Loans						
		Prevalence (%)	Conditional amounts outstanding			
			Average	25th perc	Median	75th perc
2001		*22.24%*	11,451	956	4,486	11,610
2002		*24.62%*	9,448	843	4,659	12,344
2003		*25.86%*	13,030	918	4,415	13,487
2004		*25.09%*	11,315	835	4,021	11,794
2005		*19.13%*	14,957	1,045	4,273	12,548
2006		*18.64%*	11,267	853	4,138	12,287
2007		*20.57%*	11,196	889	3,835	11,379
2008		*20.33%*	12,008	680	3,750	11,206
Total		*22.09%*	11,793	875	4,181	12,155

Note: Weighted statistics from waves 2001-2008 of DNB data. Amounts refer to constant 2008 euro.

Table 2. Loans from Social Circle

	Probit				Tobit	
	Pr(perceived ability to borrow from social circle in the future>0)		Pr(Loans from social circle>0)		E(log(Loans from soc. circle))|Loans from soc. circle>0	
	Marg. Eff.	std. error	Marg. Eff.	std. error	Marg. Eff.	std. error
IHS(avg. peer income)	0.0225	0.0079 ***	0.0084	0.0040 **	0.2653	0.1169 **
Age	-0.0088	0.0009 ***	-0.0016	0.0005 ***	-0.0509	0.0165 ***
Male	0.0442	0.0219 **	0.0043	0.0087	0.1467	0.2628
Couple	0.0352	0.0233	-0.0097	0.0113	-0.2920	0.3156
Numb of Children	-0.0032	0.0110	-0.0015	0.0049	-0.0581	0.1499
High School Education	0.0698	0.0267 ***	0.0258	0.0119 **	0.7756	0.3462 **
College Degree	0.0783	0.0262 ***	0.0070	0.0112	0.2473	0.3682
Other Education	0.2578	0.1181 **	0.0000	0.0000	0.0000	0.0000
Employed	-0.0053	0.0323	0.0126	0.0113	0.3841	0.3433
Self employed	0.0313	0.0533	0.0518	0.0315	1.4181	0.7126 **
Retired	-0.0584	0.0342 *	-0.0005	0.0148	-0.0254	0.4845
Unemployed	-0.1210	0.0519 **	-0.0035	0.0214	-0.1968	0.6611
Last year income: unusually low	-0.0787	0.0301 ***	0.0325	0.0186 *	0.8419	0.4174 **
Health poor/ fair	-0.0472	0.0202 **	-0.0026	0.0097	-0.1001	0.2979
IHS(net hh income)	0.0025	0.0042	0.0003	0.0017	0.0083	0.0530
IHS(net fin wealth)	0.0248	0.0068 ***	-0.0141	0.0031 ***	-0.6676	0.1274 ***
IHS(net real wealth)	0.0052	0.0071	0.0055	0.0038	0.1733	0.1101
Regional dummies	yes		yes		yes	
Year dummies	yes		yes		yes	
Log likelihood	-2,529.6		-820.2		-1,502.4	
Number of Observations	4,524		5,074		5,074	
	IV 1					
IHS(avg. peer income)	0.0878	0.0267 ***				
F-statistic from Auxilliary Regression (*p-value*)	208.68	*0.00* ***	250.80	*0.00* ***	250.80	*0.00* ***
Exogeneity Test (*p-value*)	6.08	*0.01* **	1.25	*0.26*	1.39	*0.24*
Number of Observations	4,363		4,899		4,899	
	IV 2					
IHS(avg. peer income)	0.1677	0.0406 ***				
F-statistic from Auxilliary Regression (*p-value*)	23.65	*0.00* ***	25.82	*0.00* ***	25.82	*0.00* ***
Sargan Hansen Test for overidentificat. (*p-value*)	0.37	*0.55*	4.99	*0.03* **	4.99	*0.03* **
Exogeneity Test (*p-value*)	6.83	*0.01* ***	2.04	*0.15*	2.04	*0.15*
Number of Observations	1,339		1,545		1,545	

Note: Marginal effects from probit regressions modeling the probability of having an outstanding loan from friends and marginal effects from tobit regressions on the log amount of loan outstanding conditional on having such loan. All marginal effects have been averaged across households in the sample using survey weights. The marginal effects for peer income are based on a 12,000 euro annual increase of the underlying variable. The marginal effects for household income, financial, and real wealth are calculated assuming a one standard deviation increase of the underlying covariates. Standard errors are corrected for heteroscedasticity and clustered at the household level. ***,**,* denote significance at 1%, 5% and 10% respectively.

Table 3. Collateralized Loans

	Probit		Tobit	
	Pr(Collateralized Loans>0)		E(log(Colat. Loans))|Colat. Loans>0	
	Marg. Eff.	std. error	Marg. Eff.	std. error
IHS(avg. peer income)	0.0444	0.0085 ***	0.4984	0.0862 ***
Age	-0.0016	0.0011	-0.0280	0.0119 **
Male	0.0001	0.0249	-0.0007	0.2959
Couple	0.1709	0.0266 ***	1.8652	0.2661 ***
Numb of Children	0.0126	0.0122	0.1059	0.1192
High School Education	0.0205	0.0291	0.2296	0.3182
College Degree	0.0728	0.0299 **	0.8510	0.3338 **
Other Education	0.0199	0.1477	0.3260	1.8588
Employed	0.0807	0.0342 **	0.8935	0.3551 **
Self employed	0.0894	0.0567	1.0961	0.5685 *
Retired	0.0312	0.0386	0.5009	0.4379
Unemployed	0.0122	0.0723	0.1606	0.8299
Last year income: unusually low	-0.0977	0.0360 ***	-1.2901	0.3688 ***
Health poor/ fair	-0.0104	0.0231	-0.1803	0.2347
IHS(net hh income)	0.0138	0.0042 ***	0.1387	0.0366 ***
IHS(net fin wealth)	0.0024	0.0066	0.0500	0.0601
IHS(net real wealth)	0.0709	0.0092 ***	0.3858	0.0540 ***
Perceived ability to borrow from soc. circle in the future	0.0091	0.0210	0.0149	0.2219
Get advice from soc. circle	-0.0296	0.0191	-0.4001	0.2152 *
Regional dummies	yes		yes	
Year dummies	yes		yes	
Log likelihood	-2,686.2		-10,412.3	
Number of Observations	4,523		4,523	
IV 1				
F-statistic from Auxilliary Regression (*p-value*)	205.48	*0.00* ***	205.48	*0.00* ***
Exogeneity Test (*p-value*)	2.12	*0.15*	2.06	*0.15*
Number of Observations	4,362		4,362	
IV 2				
F-statistic from Auxilliary Regression (*p-value*)	22.69	*0.00* ***	22.69	*0.00* ***
Sargan Hansen Test for overidentification (*p-value*)	0.17	*0.50*	0.17	*0.50*
Exogeneity Test (*p-value*)	1.92	*0.17*	1.92	*0.17*
Number of Observations	1,339		1,339	

Note: Marginal effects from probit regressions modeling the probability of having an outstanding collateralized loan and marginal effects from tobit regressions on the log amount of collateralized loan outstanding conditional on having such loan. See notes in Table 2.

Table 4. Consumer Loans

	Probit		Tobit	
	Pr(Consumer Loans>0)		E(log(Cons. Loans))|Cons. Loans>0	
	Marg. Eff.	std. error	Marg. Eff.	std. error
IHS(avg. peer income)	0.0158	0.0058 ***	0.2385	0.0810 ***
Age	-0.0021	0.0007 ***	-0.0276	0.0095 ***
Male	0.0107	0.0157	0.2180	0.1916
Couple	0.0562	0.0160 ***	0.6868	0.2313 ***
Numb of Children	0.0001	0.0071	0.0323	0.1008
High School Education	0.0175	0.0187	0.2084	0.2572
College Degree	0.0137	0.0200	0.0965	0.2634
Other Education	0.1243	0.0919	1.0343	0.9973
Employed	0.0164	0.0203	0.0757	0.2563
Self employed	0.0296	0.0349	0.1830	0.4699
Retired	0.0033	0.0266	-0.1311	0.4001
Unemployed	0.0475	0.0523	0.5328	0.5808
Last year income: unusually low	0.0726	0.0307 **	0.8331	0.2996 ***
Health poor/ fair	0.0230	0.0144	0.2769	0.1937
IHS(net hh income)	0.0042	0.0032	0.0808	0.0484 *
IHS(net fin wealth)	-0.1962	0.0042 ***	-3.4979	0.0535 ***
IHS(net real wealth)	0.0018	0.0051	0.0073	0.0887
Perceived ability to borrow from soc. circle in the future	-0.0098	0.0141	-0.1470	0.1798
Get advice from soc. circle	-0.0262	0.0126 **	-0.3693	0.1707 **
Regional dummies		yes		yes
Year dummies		yes		yes
Log likelihood	-1,692.0		-5,443.1	
Number of Observations	4,523		4,523	
	IV 1			
F-statistic from Auxilliary Regression (*p-value*)	205.48	*0.00* ***	205.48	*0.00* ***
Exogeneity Test (*p-value*)	0.40	*0.53*	0.65	*0.42*
Number of Observations	4,362		4,362	
	IV 2			
F-statistic from Auxilliary Regression (*p-value*)	22.69	*0.00* ***	22.69	*0.00* ***
Sargan Hansen Test for overidentification (*p-value*)	1.28	*0.26*	1.28	*0.26*
Exogeneity Test (*p-value*)	0.00	*0.97*	0.00	*0.97*
Number of Observations	1,339		1,339	

Note: Marginal effects from probit regressions modeling the probability of having a consumer loan and marginal effects from tobit regressions on the log amount of consumer loan outstanding conditional on having such loan. See notes in Table 2.

Table 5. Placebo Regressions

Panel A. Collateralized Loans				
	Pr(Collateralized Loans>0)		E(log(Colat. Loans))|Colat. Loans>0	
	Marg. Eff.	std. error	Marg. Eff.	std. error
IHS(avg. peer income)	-0.0061	0.0057	-0.0031	0.0710

Panel B. Consumer Loans				
	Pr(Consumer Loans>0)		E(log(Cons. Loans))|Cons. Loans>0	
	Marg. Eff.	std. error	Marg. Eff.	std. error
IHS(avg. peer income)	-0.0025	0.0043	0.2340	0.1979

Note: Selected marginal effects from probit regressions modeling the probability of having a formal loan and marginal effects from tobit regressions on the log amount of the loan outstanding conditional on having such loan. Peer income is that of a randomly assigned household belonging to the same year, age, education, gender cell as the respondent's social circle. The marginal effects for peer income are based on a 12,000 euro annual increase of the underlying variable. Specifications in panel A (panel B) condition on the same set of covariates used in the baseline specifications in Table 3 (Table 4). Standard errors are corrected for heteroscedasticity and clustered at the household level. ***,**,* denote significance at 1%, 5% and 10% respectively.

Table 6. Asymmetric Effects of Peer Income

Panel A. Loans from Social Circle						
	Pr(perceived ability to borrow from social circle in the future>0)		**Pr(Loans from social circle>0)**		**E(log(Loans from social circle))|Loans from social circle>0**	
	Marg. Eff.	**std. error**	**Marg. Eff.**	**std. error**	**Marg. Eff.**	**std. error**
IHS(own income)-IHS(avg. peer income)>0	0.0116	0.0054 **	0.0009	0.0023	0.0254	0.0654
IHS(own income)-IHS(avg. peer income)<0	0.0111	0.0045 **	0.0062	0.0024 ***	0.2056	0.0692 ***
Panel B. Collateralized Loans						
			Pr(Collateralized Loans>0)		**E(log(Colat. Loans))|Colat. Loans>0**	
			Marg. Eff.	**std. error**	**Marg. Eff.**	**std. error**
IHS(own income)-IHS(avg. peer income)>0			-0.0041	0.0060	-0.0054	0.0682
IHS(own income)-IHS(avg. peer income)<0			0.0366	0.0052 ***	0.3184	0.0423 ***
Panel C. Consumer Loans						
			Pr(Consumer Loans>0)		**E(log(Cons. Loans))|Cons. Loans>0**	
			Marg. Eff.	**std. error**	**Marg. Eff.**	**std. error**
IHS(own income)-IHS(avg. peer income)>0			0.0034	0.0037	0.0516	0.0531
IHS(own income)-IHS(avg. peer income)<0			0.0104	0.0033 ***	0.1642	0.0494 ***

Note: Selected marginal effects from probit regressions modeling the probability of having a loan and marginal effects from tobit regressions on the log amount of the loan outstanding conditional on having such loan. Presented marginal effects are based on a 12,000 euro annual increase of peer income. Specifications in panels A, B, and C condition on the same set of covariates used in the baseline specifications in Tables 2, 3, and 4, respectively. Standard errors are corrected for heteroscedasticity and clustered at the household level. ***,**,* denote significance at 1%, 5% and 10% respectively.

Table 7. Living Standards, Perceived Ability of the Social Circle to Spend, and Expected Future Own Income

Panel A. Collateralized Loans

	Probit		Tobit	
	Prob(Collateralized Debt>0)		E(log(Colat. Debt))|Colat. Debt>0	
	Marg. Eff.	std. error	Marg. Eff.	std. error
IHS(avg. peer income)	0.0352	0.0088 ***	0.4097	0.0906 ***
Avg sq. meters of friends	0.0215	0.0104 **	0.2841	0.1244 **
Own sq. meters	0.0423	0.0172 **	0.3796	0.1337 ***
IHS(perceived lower bound on next period's income)	0.0452	0.0128 ***	0.4828	0.1267 ***
Log likelihood	-2,436.4		-9,875.9	
Number of Observations	4,206		4,206	

Panel B. Consumer Loans

	Probit		Tobit	
	Prob(Consumer credit>0)		E(log(Cons. credit))|Cons. credit>0	
	Marg. Eff.	std. error	Marg. Eff.	std. error
IHS(avg. peer income)	0.0127	0.0061 **	0.1838	0.0881 **
Soc. circle has more money to spend than I	0.0123	0.0049 **	0.1820	0.0633 ***
IHS(perceived lower bound on next period's income)	0.0012	0.0092	0.0258	0.1313
Log likelihood	-1,361.9		-4,443.3	
Number of Observations	3,669		3,669	

*Not*e: Selected marginal effects from probit regressions modeling the probability of having a formal loan and marginal effects from tobit regressions on the log amount of the loan outstanding conditional on having such loan. The marginal effects for peer income are based on a 12,000 euro annual increase of the underlying variable. The marginal effects for average sq. meters of friends, own square meters, and expected income next period are calculated assuming a one SD increase of the underlying covariates. Specifications in panel A (panel B) also condition on the set of covariates used in the baseline specifications in Table 3 (Table 4). Standard errors are corrected for heteroscedasticity and clustered at the household level. ***,**,* denote significance at 1%, 5% and 10% respectively.

Table 8. Peer Income and Over-indebtedness

	Tobit			Tobit		
	E(Loan to Value Ratio)			E(Debt Servicing Ratio)		
	Marg. Eff.	std. error		Marg. Eff.	std. error	
IHS(avg. peer income)	0.0371	0.0058	***	0.0102	0.0034	***
Age	-0.0040	0.0008	***	-0.0005	0.0005	
Male	-0.0044	0.0174		0.0103	0.0102	
Couple	0.1115	0.0175	***	0.0267	0.0102	***
Numb of Children	0.0092	0.0075		0.0008	0.0043	
High School Education	0.0011	0.0188		0.0202	0.0109	*
College Degree	0.0434	0.0190	**	0.0301	0.0116	***
Other Education	0.0547	0.1228		0.0457	0.0797	
Employed	0.0707	0.0206	***	0.0363	0.0149	**
Self employed	0.0911	0.0370	**	0.0263	0.0240	
Retired	0.0467	0.0254	*	0.0202	0.0162	
Unemployed	0.0158	0.0474		0.0326	0.0303	
Last year income: unusually low	-0.0933	0.0207	***	-0.0478	0.0115	***
Health poor/ fair	-0.0161	0.0142		-0.0082	0.0082	
IHS(net hh income)	0.0106	0.0030	***	0.0172	0.0017	***
IHS(net fin wealth)	0.0103	0.0051	**	0.0015	0.0025	
IHS(net real wealth)	-0.0037	0.0067		0.0218	0.0037	***
Perceived ability to borrow from soc. circle in the future	-0.0096	0.0125		-0.0033	0.0082	
Get advice from soc. circle	-0.0310	0.0135	**	-0.0096	0.0079	
Regional dummies		yes			yes	
Year dummies		yes			yes	
Log likelihood	-3,144.8			-1,801.0		
Number of Observations	4,504			3,722		
IV 1						
F-statistic from Auxilliary Regression (*p-value*)	205.85	*0.00*	***	196.53	*0.00*	***
Exogeneity Test (*p-value*)	1.48	*0.22*		0.24	*0.62*	
Number of Observations	4,331			3,578		
IV 2						
F-statistic from Auxilliary Regression (*p-value*)	22.65	*0.00*	***	21.79	*0.00*	***
Sargan Hansen Test for overidentification (*p-value*)	0.95	*0.33*		0.59	*0.44*	
Exogeneity Test (*p-value*)	1.13	*0.29*		0.11	*0.74*	
Number of Observations	1,331			948		

Note: Marginal effects from tobit regressions on measures of financial distress. All marginal effects have been averaged across households in the sample using survey weights. The marginal effects for peer income are based on a 12,000 euro annual increase of the underlying variable. The marginal effects for household income, financial, and real wealth are calculated assuming a one standard deviation increase of the underlying covariates. Standard errors are corrected for heteroscedasticity and clustered at the household level. ***,**,* denote significance at 1%, 5% and 10% respectively.