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Mortgage risks, debt literacy and financial advice *

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Abstract

A limited understanding of mortgage contracts and the risks involved may have contributed to the origination of the financial crisis. We have designed a special questionnaire to relate mortgage loan decisions to financial literacy and financial advice. Our findings show that homeowners seem well aware of mortgage risks. Loans are perceived more risky when they are large compared to the home value, entail high mortgage payments compared to income and when they are linked to investment vehicles. Homeowners with riskier mortgages know they may encounter financial problems when housing prices or income declines. Individuals with a lower level of financial literacy are more likely to take out traditional mortgages which pay off the principal at maturity. Riskier mortgages are more prevalent among homeowners with a better understanding of loan contracts. Financially less sophisticated homeowners who consult intermediaries for professional financial advice hold more risky mortgages as well.

Keywords: mortgage choice, risk-taking, financial knowledge, professional financial advice.
JEL classifications: G21, D83, D12, D14.

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1 Introduction

Taking out a mortgage loan is not an easy decision; households are faced with a large choice menu of mortgage types of which many have complicated features. Moreover, households have to take into account the features of the tax system, expected house price developments, income growth, expected interest rate movements and the uncertainty surrounding these expectations. There is not much room for learning from past experience as mortgages are taken out infrequently. Yet, the choice of a mortgage loan is an important decision with long-term financial consequences.

Given the complexity of the decision, it is important that households who take out a mortgage loan have adequate financial knowledge or access to professional advice. Several recent studies however do suggest that financial knowledge of a typical household is limited and arguably insufficient to take out a mortgage loan without guidance (Lusardi and Mitchell 2007; Van Rooij et al., 2011). These households may benefit from professional financial advice from a mortgage broker or other financial intermediary. Professional financial advice, however, does not necessarily result in better mortgage choices, especially when brokers receive a commission from the lender. When the commission varies with the mortgage size and type, the intermediary may face a financial incentive to recommend a mortgage loan that is not in the optimal interest of the household. Households with limited financial sophistication, in particular when they are unaware of this commission structure, are prone to biased financial advice. There is relatively little empirical evidence whether financial advice affects mortgage choices.[1]

This paper analyzes the relationship between financial literacy and mortgage choice and the link with financial advice. More specifically we examine whether financially sophisticated households have a different perception of the risks of their mortgage loan and whether they take out different mortgages compared to households with lower levels of financial knowledge. In addition, we examine whether households who consult a financial intermediary for advice end up with mortgages with different features.

To investigate these issues, we have designed a special questionnaire for the CentERpanel, which answers Internet-based household surveys in the Netherlands. Our survey collects information on mortgage risks, financial literacy and the role of financial advice in choosing a mortgage. We explicitly measure the risks of a mortgage loan and the riskiness of different mortgage attributes as perceived by the borrower. The financial literacy questions in our survey put special emphasis on the understanding of characteristics of debt contracts such as a mortgage loan. These debt literacy questions designed by Lusardi and Tufano (2009) are more specific and detailed compared to the 'basic' financial literacy questions from Lusardi and Mitchell (2007) who measure the knowledge about basic financial principles which are important to make financial decisions in everyday life. The basic financial literacy questions are shown to be important determinants of, for instance, retirement planning (Alessie et al., 2011) and investment in the stock market (Van Rooij et al., 2011). A good basic financial literacy by itself, may however be insufficient to make debt decisions which have an infrequent character and therefore provide

[1] The theoretical implications of financial advice when the household is unsophisticated and unaware about the role of the financial adviser are well understood (see Inderst and Ottaviani, 2012). Gabaix and Laibson (2006) theoretically show that financial companies benefit from offering complex mortgage terms to unsophisticated households. Woodward and Hall (2012) provide suggestive empirical evidence that offering complex mortgages to unsophisticated households is profitable for mortgage brokers.

little opportunity to learn from experience, such as choosing a mortgage contract. Using both sets of literacy questions we are able to assess which component of financial literacy influences mortgage choice.

There are several reasons why it is especially informative to examine these questions in the Netherlands. First, the mortgage market in the Netherlands is well-developed and innovative with a large number of non-traditional mortgage products available. Interest-only mortgages and endowment mortgages which are linked to a life-insurance policy are very popular because of the tax relief for mortgage interest payments. Second, there is no requirement to make a down payment upon the purchase of a home. It is common practice, in particular for first time buyers, to add transaction costs, such as transfer tax and notary fees, to the loan amount. As a result, the mortgage loan amount does often exceed the value of the underlying property. Third, mortgage loans are with 'recourse', as in most other European countries and some US state, which implies that the borrower is liable for the deficiency in case of default. This shifts the risks in the mortgage contract towards the borrower. Fourth, the Netherlands experienced a sharp rise in housing prices starting at the early 1990s, followed by a strong depreciation since 2008. During the continuing appreciation of housing prices many households bought houses financed with high mortgages. The drop in housing prices and worsening of labor market conditions in the aftermath of the financial crisis put these households in great financial risk.

Our main findings are: First, households display less knowledge of loan contracts than knowledge of basic financial concepts, suggesting that loans are complex products for consumers to understand. Moreover, the debt literacy measure is better able to explain the variation in mortgage risks than the more general basic financial literacy measure. Second, homeowners associate the following loan characteristics with risky mortgages: high loan-to-value ratios, high loan-to-income ratios and complex features such as a linked life-insurance policy which invest part of the loan payments in the stock market. Third, home owners with higher levels of debt literacy typically possess more risky mortgages. Financially less sophisticated homeowners are more likely to have traditional mortgages which pay off the loan principal gradually such as an annuity or linear mortgage. Fourth, homeowners who consider themselves unable to originate a mortgage without the help from a professional more often consult a professional financial advisor. Yet, households with a limited understanding of loan contracts, who may need the advice the most, do not more often seek professional financial advice than more sophisticated homeowners. Fifth, homeowners who consult professional financial advisors have more risky mortgages. This effect seems is more pronounced for homeowners with low levels of financial literacy.

These results highlight a number of policy implications for financial education and advise. Worldwide a multitude of initiatives is directed at increasing financial knowledge and awareness. As a first implication, our findings suggest that these should go beyond basic financial concepts and pay attention to the specifics of loan decisions. As mortgage decisions are both complex and have far-reaching financial consequences, households better be well equipped for these decisions. Second, given the crucial role of independent financial advice, the incentive structure of advisor's compensation need to be aligned with the interest of the consumers as it is difficult for consumers with limited financial sophistication to assess the quality of advice.

The remainder of the paper is organized as follows. Section 2 motivates our research questions

and discusses related literature on mortgage choices and financial literacy. Section 3 explains the features of the Dutch mortgage market. Section 4 describes the survey design. Section 5 and 6 discuss our measures of mortgage risks and financial literacy, respectively. Section 7 investigates the relation between financial literacy, mortgage choice, mortgage risks and financial advise. The final section concludes and discusses implications.

2 Motivation and related literature

The recent financial crisis has shown that mortgage decisions can have a huge impact on the financial situation of a household. Currently, many households find themselves with a mortgage loan worth more than the value of the residence because of a drop in house prices. Others face difficulties to make mortgage payments because of a loss in earnings—or due to other adverse events which make it difficult to meet mortgage payments, such as a divorce. Distressed households who cannot afford to pay their mortgage will ultimately default on the loan and have to sell their house. The costs of default are particularly high in the case of a foreclosure. A forced sale of the house typically results in a large discount on the sales price.[2] If the sales price of the property does not cover the outstanding mortgage debt, the borrower may be liable for the deficiency which then has to be paid out off financial assets or future income.

In many US states, the lender commonly decides not to go after the deficiency to reduce the length of the foreclosure process, mainly because this is prohibited or restricted by law. These so-called 'non-recourse loans' provide homeowners with negative equity an incentive to strategically default (Ghent, 2011). This resulted in many US mortgage defaults in the course of the 2008 financial crisis when the value of houses declined and job losses pushed households into payment problems.[3] In most European countries (and some US states) the mortgage is a 'recourse loan' which means that the lender can enforce the borrower to pay the deficiency. The financial risk of default is then shifted towards the borrower.[4]

For households with negative equity who fall behind on their mortgage payments this can result in serious financial problems or even bankruptcy. This stressful situation from which it is difficult to recover might lead to further adverse consequences which go beyond the financial domain, such as depression or health problems (Currie and Tekin, 2011). Against this background it is important to investigate whether borrowers are aware of the risks of a mortgage loan.

Recent studies for the US show that default rates are high among borrowers with non-traditional mortgage loans (Mayer et al., 2009; Demyanyk and Van Hemert, 2011; Amromin et al., 2011). These alternative mortgage products differ from traditional mortgages as they have low (initial) mortgage payments and require limited or deferred repayment of the principal. Low mortgage payments make owner occupied housing more affordable for households who

[2]Campbell et al. (2011) find an average discount on the market value of 27 percent for the US. In the Netherlands a foreclosure sale, typically executed through a public auction, results on average in a discount of 20 percent (CPB, 2009).

[3]Several empirical studies indicate that default behavior is driven by a combination of payment problems and negative equity (e.g. Elul et al., 2010; Gerardi et al., 2013). Negative equity by itself does not always lead to default on 'non-recourse' loans because of the high costs of moving, the reduced credit rating or the risk of being sued; see Guiso et al. (2013) for the determinants of strategic default.

[4]See for example ECB (2009) for a description of differences in housing finance between the US and the Euro area.

anticipate strong increases in future income or in house prices. Moreover, in some countries, the deferred repayment of the principal allows borrowers to reduce tax expenditures because of the tax-deductibility of mortgage interest. Hence, non-traditional mortgages may be beneficial for sophisticated borrowers; see, for example, Cocco (2013) for an overview of the benefits of non-traditional mortgage products. However, due to the complex nature of these mortgages, they can also be taken out by less sophisticated borrowers who are not aware of the risks.

In light of the US subprime mortgage crisis, several recent studies examine the default behavior and financial sophistication of households taking out risky mortgage products. Gerardi et al. (2013) show that financially illiterate borrowers are more likely to default on their mortgage loans. However, they find no evidence that higher default rates are the result of riskier mortgage terms, such as high loan values with respect to income and house value or adjustable rate mortgages. They suggest that borrowers with a lower level of financial literacy more often default because of their inability to accumulate sufficient wealth to absorb expenditure shocks after the take out of the loan. The research by Klapper et al. (2013) documents that individuals with a lower level of financial literacy are indeed less able to deal with macroeconomic shocks.

Another potential channel through which financial literacy affects defaults is the inability to assess the affordability of the mortgage over the life of the loan, for example, because of having incorrect expectations about income growth, investment returns or house price appreciation. Stafford et al. (2012) show that US households allocate too much of their household income to mortgage payments in times when the labor market is performing well and house prices appreciate. On the other hand, Amromin et al. (2011) suggest that a lower level of financial literacy might also increase the likelihood of default, because of lower assessed costs of default such as reputation loss, penalty charges, or lower credit rating by less sophisticated households. By contrast, for non-traditional mortgages, such as interest-only mortgages, Amromin et al. (2011) find that more sophisticated borrowers (based on credit scores and income) are more likely to default on the mortgage loan, possibly because of strategic reasons. They also show that more sophisticated individuals are more likely to hold interest-only mortgages. This is also found by Cox et al. (2014) who study the association between mortgage type choice and self-assessed financial knowledge among households in the Netherlands.[5]

We contribute to this literature by explicitly measuring the riskiness of the mortgage loan and risk perception instead of analyzing default behavior (which might be unrelated to the 'objective riskiness' of the mortgage loan). In addition, we examine the role of professional financial advice in mortgage choice. The empirical literature on the role of professional financial advice in shaping consumer decisions mainly focusses on investment decisions and is limited. Finally, we measure both the understanding of basic financial concepts, as well as the understanding of complex loan contracts.

[5]Interestingly, our results confirm that individuals who report a higher self-assessed financial knowledge more often own an interest-only mortgage. However, we are able to analyze the relation with objective knowledge and we do not find that having an interest-only mortgage is related to the actual level of financial literacy.

3 An outline of the Dutch mortgage market

The Netherlands has a large menu of residential mortgage types available compared to other countries. Over the years several innovative mortgage types have been developed which make optimal use of the tax deductibility of mortgage interest. Mortgage interest rate payments are fully deductible at a maximum rate of 52 percent for persons in the highest tax bracket.[6]

The most common mortgage loan is an interest-only mortgage where the borrower pays interest but does not repay the principal. The principal has to be paid back at the end of the loan which is usually after 30 years. As the outstanding mortgage balance does not change during the life of the mortgage, a maximum amount of interest payments can be deducted for the whole period. Another widely available mortgage type is an endowment mortgage consisting of an interest-only mortgage which is linked to a savings account in the form of an universal life insurance policy. The borrower pays both interest and an insurance premium which is set aside to pay off the principal after 30 years. The cash value of the accumulated savings in the life insurance policy is exempted from wealth taxation.[7] A related mortgage type is an investment based mortgage where the premium is invested in the stock market. Borrowers who take out investment based mortgages run the risk of ending up with insufficient funds to pay off the mortgage at maturity in case of bad investment returns. Traditional fully amortizing mortgages —where the principal is gradually repaid based on a linear or annuity type of repayment scheme— are rare in the Netherlands because of the tax relief. The majority of the mortgages are fixed rate mortgages (FRM) with a fixed term range between 5 and 10 years. A small fraction of the purchased mortgages has an adjustable rate (ARM) which follows market interest rate developments quickly.[8]

The combination of the generous mortgage interest deduction before payment of income tax and the relaxation of lending rules by financial institutions in the second half of the 1990s encouraged the origination of large mortgage loans (DNB, 2000). Mortgage lenders in principle require no down payment and transaction costs are typically added to the loan amount. Mortgage loans which exceeds the value of the property are very common: mortgages with a loan-to-value (LTV) ratio between 110 percent and 115 percent have been the norm. In 2010 there was no maximum for the amount of the mortgage compared with the value of the house.[9] The typical LTV ratio is much lower in other countries. In the US, LTV ratios of about 75 percent are common and this is even lower in countries such as the UK and Germany where the typical LTV is about 70 percent (Green and Wachter, 2005). As a result of the large mortgage loans and limited repayment of the mortgage principal the Netherlands has a large mortgage debt outstanding to GDP of 107 percent, compared to 76.5 percent in the US and less than 50 percent in Germany (EMA, 2012). In fact, the Netherlands is among the countries with the largest outstanding mortgage debt as a percentage of GDP in the world. Thus borrowers bear significant

[6]The government has decided to gradually reduce the maximum deduction from 52 percent in 2013 to 38 percent in 2041. Many other countries with mortgage interest deduction changed their rules earlier; either by abolishing opportunities for mortgage interest deduction (as in the UK), or reducing it to a large extent (as in the US).

[7]Endowment mortgages are also common in the UK but rarely exist in other countries (Devereux and Lanot, 2003).

[8]DNB Statistics (2010); available from: <http://www.statistics.dnb.nl>, [October 2, 2014]

[9]AFM 2009, Assessment framework mortgage credit granting (in Dutch).

risk in case of a decline in house prices as has occurred over the past couple of years.[10]

Some borrowers have the option to buy a national mortgage guarantee (NMG) which insures both lenders and borrowers against losses in the case of default. The aim of the NMG is to encourage home ownership.[11] Borrowers with an NMG are insured against loss in the event of default when the payments problems arise involuntary, for example because of divorce, forced unemployment, or decease of the spouse. These borrowers are released from the obligation to pay back the remaining debt (if they do not have enough housing equity or financial assets necessary to pay back the mortgage loan). The NMG insures mortgages for houses up to € 290,000 in 2013. One of the conditions to apply for NMG is that at least half of the value of the mortgage had to be fully amortizing. After paying a modest premium to buy NMG insurance, borrowers with an NMG mortgage pay a slightly lower interest rate because the lender bears less risk.[12]

4 Data

4.1 The mortgage risks questionnaire

We have designed a detailed questionnaire on mortgage risks, debt literacy and financial advice. The questionnaire was fielded in the CentERpanel in the weekend of June 18, 2010. The CentERpanel is an Internet based panel of over 2,000 households administrated by CentERdata at Tilburg University and sponsored by the Nederlandsche Bank. The panel is representative of the Dutch population. Panel members without internet access receive a set-top box and equipment that enables them to participate through their television. Within each household both the head and the partner aged 20 or above were interviewed. The questionnaire has been presented to 2,184 household members of which 1,464 members (1,185 households) have completed the survey; this implies a response rate of 67 percent at the individual level. This corresponds with the response rates to the modules of the annual DNB Household Survey (DHS), which is the main project based on the CentERpanel; see Teppa and Vis (2012).

In our sample the homeownership rate is 73.8 percent (874 households); 85.6 percent of the homeowners (748 households) indicate that they have a residential mortgage loan on their property. This is somewhat higher compared to the ownership rate among Dutch households. We use sample weights to make sure that the reported statistics are representative of the Dutch population. The sample weights are based on the joint distribution of disposable household income, homeownership status and age of the head of the household as reported by Statistics Netherlands.[13]

The questionnaire on mortgage choice is combined with background information from the 2010 DHS. The DHS is an annual panel study which collects detailed information on wealth

[10] As a result, new measures have been implemented by the Dutch government to prevent disproportionately large mortgage loans. For example, an LTV-cap has been introduced by law which will be reduced gradually from 106% in 2012 to 100% in 2018.

[11] The NMG has similarities with FHA mortgages in the US which only insures the lender against the risk of default.

[12] NMG, Conditions and Norms of the National Mortgage Guarantee (in Dutch), available from: <http://www.nhg.nl>. [October 2, 2014].

[13] For individual household members the weighted sample statistics match the joint distribution of gross personal income, age and gender.

holdings, earnings, socio-demographic information and behavioral traits, such as risk preferences and time preferences, to study the determinants of saving behavior. The DHS consists of six modules. The module on accommodation and mortgages was conducted in the same weekend as our questionnaire. This module is answered by the household member managing the household finances (which we designate as the head of the household if both members participate in our questionnaire). Upon merging our survey with the mortgage information we have an 80.4 percent match rate for households with a mortgage.[14] The merged sample includes 592 households (755 individuals) who own a mortgage loan. For these households financial statistics about the mortgage loan were constructed as will be described in the next section. We excluded all households with missing values or obvious reporting errors on important characteristics of the mortgage loan in our analysis of mortgage choice. This reduces the sample size to 531 households (680 individuals).

We use two sets of literacy questions (measuring basic financial literacy and debt literacy respectively) to assess whether financial literacy (and which component of financial literacy) is related to the features and riskiness of the mortgage loan. In addition, we ask individuals to assess their ability to take out a mortgage loan without professional advice. The financial literacy questions were fielded in a separate questionnaire one week before the questionnaire on mortgage risks. The financial literacy questions were answered by 91.1 percent of the respondents in the mortgage risks survey. We have 1,080 households (1,324 individuals) with non-missing information on financial literacy.[15] The final sample, which we use for the empirical analysis of mortgage risks and financial literacy, includes 459 households who own a mortgage.

4.2 Mortgage characteristics

Following the literature on mortgage default we construct several financial measures which are related to payment problems and mortgage default, as for example, shown by Cocco (2013). First, we calculate the original loan-to-value ratio (OLTV), defined as the ratio between the original loan amount and the purchase price of the house. The current loan-to-value ratio (CLTV) is computed by dividing the outstanding mortgage balance and the current self-reported house value.[16] For endowment mortgages and investment based mortgages we take into account the cash value of the savings account linked to the mortgage to pay off the principal at maturity. We also create a dummy variable for households with a LTV ratio exceeding 100 percent.

Second, to measure the payment burden of the loan we compute the current payment-to-income ratio (CPTI) as the ratio of the gross mortgage payments relative to the net household income. We define the current loan-to-net income ratio (CLTI) as the ratio of the current loan amount and disposable household income. We are able to retrieve disposable household income

[14] We are able to retain some additional households by using information from adjacent years.

[15] We exclude six households from our sample who consistently answered 'Do not know' to all basic financial literacy and debt literacy questions, as well as to other questions in the questionnaire. We have verified that this does not affect the empirical results.

[16] For some households the mortgage consists of a combination of loans. A typical combination of loans is a mortgage with an interest-only component and a component that is an endowment mortgage or investment based type of mortgage. In addition, some households take out second mortgages to extract equity or to finance home improvements. In the analysis we use the combined loan amount. For the other characteristics, such as the mortgage type, we use the characteristics of the first mortgage.

at time of home purchase only if the household participated in the DHS in the year the house was bought. This information is available for about sixty percent of the households in our sample who bought a house after 1993 (the starting year of the DHS). For those households we calculated the original loan-to-income ratio (OLTI).

Table 1 presents financial characteristics of the mortgage loans by age and by year of purchase of the house and year of origination of the mortgage. The data show that over the last decade an increasingly large share of the property value is funded by the mortgage loan. For houses purchased after 2007, the majority of the households take out a mortgage loan exceeding the value of their property. The number of households with an original LTV ratio of more than hundred percent rose from 25.0 percent in the early 1990s to 67.3 percent for houses purchased after 2007. The average original LTV ratio is 103 percent for households who purchased a house after 2007. Over the same period the loan amount relative to the net household income (at time of purchase of the house) also increased sharply. The average original LTI ratio increased from 6.2 between 1996 and 1999 to 9.1 after 2007. The large mortgage loans imply that homeowners have to allocate a large share of their household income to mortgage payments. The gross current payment-to-net income (PTI) ratio of mortgages originated after 2007 is about 50 percent; the net current PTI ratio will be lower if we take tax-deduction of mortgage interest payments into account.

Mortgages with high LTV and LTI ratios are in particularly taken out by younger households. Households below age 40 on average have an original LTV ratio of 103 percent; more than 60 percent have an original LTV ratio of more than hundred percent. Households aged 70 and over have an average original LTV ratio of 89 percent; only 11.8 percent has purchased their house with a mortgage loan exceeding the value of the property. This is probably because existing homeowners are encouraged by tax rules to use positive housing equity for the purchase of a new house while first-time homeowners are not required to make any down payment. Moreover, older homeowners are better able to make a down payment if they have accumulated some financial assets in the course of their life.

The average current LTV ratio is in many cases lower than the original LTV because of a repayment of the principal or increase in the price of the property over the course of the loan. Nevertheless, about 23 percent of the households younger than 40 have negative equity in 2010. The price of owner occupied houses declined on average by 15.6 percent between June 2010 and June 2013 as reported by Statistics Netherlands. This group of households also makes large mortgage payments as a share of total household income. It is questionable whether they are able to continue paying the mortgage loan when their household income declines, for instance, because of job loss or divorce. The combination of negative equity and a large payment burden puts these young households in a risky position. The remaining mortgage debt of the older age groups is limited: less than 2 percent of the households in the age group 50 to 59 have negative equity and it is almost non-existent for households in the retirement phase.

Table 2 shows the percentage of mortgage types by age and by year of purchase of the house and year of origination of the mortgage. Interest-only mortgages account for about 55 percent of all originated mortgages after 2007, while more traditional repayment mortgages, such as fully amortizing mortgages, account for only a small fraction. A large proportion of the

households owns an endowment mortgage: about 35 percent of the mortgages purchased after 2007. Endowment mortgages are often originated by younger households while older households more often own interest-only mortgages. The relative high prevalence of repayment mortgages among younger households —who have accumulated little housing equity— limits their risk of building up an excessive debt.

Around the year 2000, a substantial part of the originated mortgages was linked to an investment vehicle because stock prices were soaring and expected stock market returns were high in these days. Investment based mortgages became less popular after 2000 due to the poor realized investment returns, that contributed to shortfalls in investment mortgages. After 2007, the proportion of purchased investment based mortgages has declined to less than 3 percent of all new mortgage loans.

5 Measuring perceived mortgage risks

We are interested in the mortgage risk faced by the borrower which affect the likelihood of delinquency and mortgage default and therefore the quality of the mortgage loan portfolio of the lender. The risks associated with a mortgage contract for the borrower can be classified into two important types. First, there is an 'income risk' of being unable to meet mortgage payments, because household income declines or interest rates rise for ARM mortgages. Second, there is a 'wealth risk' of having a mortgage which exceeds the value of the property, as a result of house price declines, lending in excess of the housing value, or a forced sale of the house below the market value in case of default that usually results in a discount on the selling price.

Having negative home equity is no problem as long as there are no payment problems. In case of payment problems—for example because of job loss or a divorce—the borrower may cut in non-mortgage expenses or agree with the lender to temporarily suspend or reduce mortgage payments. When payment problems remain the borrower will eventually be forced to sell the house or go into foreclosure. A sale of the house requires that the mortgage has to be repaid. If the sale price is insufficient to pay off the mortgage the borrower has to pay back the deficiency.[17]

Different mortgage contracts might balance both sources of risk differently.[18] In our survey we measure the borrowers perception of the 'overall' riskiness of their own mortgage contract by asking the respondents to assess the overall riskiness on a four point scale from 1 corresponding to 'no risk' to 4 corresponding to 'very risky'.

In addition, we separately measure both individual sources of risk. The perceived risk of a payment problem (i.e. income risk) follows from a question in which the respondents indicate their ability to meet payments (for living) under several adverse income shocks, such as temporary unemployment, divorce or an increase of the mortgage interest rate. The perceived risk of negative home equity (i.e. wealth risk) is measured by asking the respondents whether they expect to experience financial distress in case of a large drop in in their home value of 20

[17] NMG insured borrowers are to a large extent protected against residual debt in case of involuntary default as described in Section 3, but there is no full coverage. The insured amount decreases as if the original mortgage is paid off according to an annuity mortgage.

[18] Campbell and Cocco (2003) formulate a model which describes the trade-off between both income risk and wealth risk for traditional mortgages, and Campbell (2011) provide a model that is also applicable to non-traditional mortgages, such as interest-only loans.

percent. This happens to approximate the actual decline in house prices in the years after the questionnaire (between 2010 and 2013).

Table 3 presents the response frequency for the three questions on the perceived riskiness of the mortgage contract originated by the mortgage owners in our sample. Only a few mortgage owners consider their mortgage very risky (1.8%). The majority of the borrows described their loan as having hardly any risks (46.3%), while about a quarter of the mortgage owners characterized their mortgage loan as somewhat risky (27.0%), and one in five consider the loan not risky at all (21.2%). About one-third of the mortgage owners state that they are able to meet their mortgage payments under any circumstances (31.4%), while almost two-thirds of the borrowers expect to run into payment problems after an adverse income shock (64.6%). A significantly smaller group of borrowers is convinced that a drop in house prices leads to serious financial problems (25.7%). This group is worried especially about having insufficient funds to pay off the mortgage at maturity and being unable to move because of negative home equity. A relatively small group of mortgage owners indicate that this leads to (immediate) financial problems (16.9%).

Table 4 shows the relation between the perceived riskiness associated with the mortgage contract and the financial characteristics of the mortgage. The financial characteristics of the mortgage (e.g. the LTV and LTI ratio) have been divided in three quantiles (low, intermediate, and high). We first investigate the link between the overall riskiness of the mortgage contract and financial mortgage characteristics. Because of the small size, the 'very risky' group is taken together with the 'somewhat risky' group. We find plausible correlations between perceived risk and actual mortgage characteristics related to the LTV ratios and LTI ratios suggesting that mortgage owners do recognize important risk characteristics of their mortgage, for example: 44.5% of the mortgage owners with a high current LTV consider their loan as risky, while just 9.5% percent of the mortgage owners with a low LTV perceive their loan as risky. We find the same pattern for the other financial characteristics of the mortgage loan, such as the current loan amount in relation to net income (LTI) and mortgage payments in relation to net income (PTI). The association between the financial features of the mortgage loan and respectively income risk and wealth risk is very similar.

Table 5 shows that the majority of the respondents who took out an investment based mortgage view their mortgage as risky (71.7%) while only 10.9% of those who own a traditional amortization mortgage view their mortgage as risky. More common types of mortgages, such as endowment and interest-only mortgages are typically viewed as hardly or not at all risky by their owner. It seems that borrowers of which the interest rate of their mortgage can be changed quickly (ARMs) do not consider their mortgage as more risky compared to mortgages where the interest rate is fixed (FRMs). Borrowers with a National Mortgage Guarantee (NMG) do not consider their mortgage as less or more risky than uninsured mortgages. However, borrowers with an NMG secured loan are more certain than others that they can meet mortgage expenses under any circumstances. This may be the result of strict affordability rules to qualify for NMG secured loans. Finally, borrowers who consult an intermediary are more likely to rate their mortgage as risky (not reported). We cannot infer a causal direction from this: consulting an intermediary might lead to a higher risk consciousness and borrowers planning to take out a

riskier mortgage may be more likely to ask advice from an intermediary.

6 Measuring financial literacy

6.1 Financial literacy

Do individuals who are less financial literate and may have limited understanding of the features of a mortgage contract choose riskier mortgages? We assess the respondents' understanding of basic economic principles such as interest rates, inflation and portfolio diversification using the three financial literacy questions developed by Lusardi and Mitchell (2007). These basic financial literacy questions are extensively examined in a previous study on retirement planning by Alessie et al. (2011) using the same panel of households. We refer to these questions as 'financial literacy' questions. The exact wording of the questions is (correct answers are typeset in bold):

1. Suppose you had euro 100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow? **i) More than euro 102** ii) Exactly euro 102 iii) Less than euro 102 iv) Do not know.

2. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account? i) More than today ii) Exactly the same **iii) Less than today** iv) Do not know.

3. Buying a company stock usually provides a safer return than a stock mutual fund. True or false? i) True **ii) False** iii) Do not know.

Table 6 reports the responses to these questions. The first question is answered correctly by about 90.7 percent of the respondents while 6.6 percent of the respondents did not know the answer.[19] This score is higher compared to the US where about 65 percent of the respondents answered this question satisfactory and 13.5 percent did not know the answer; see Lusardi and Mitchell (2011). We should be careful with a comparison of both countries, however, because the questions are translated in a different language. Van Rooij et al. (2011) show that a small difference in the wording of literacy questions can have an important influence on the answers of the respondents. The second and third question are answered correctly by respectively 84.6 percent and 58.1 percent of the respondents. The third question is obviously the most difficult one and 30.4 percent of the respondents answer that they do not know the answer. The bottom panel of Table 6 shows the distribution of the number of correct answers. More than half of the respondents answered all three questions correct. It thus seems that the majority has a good understanding of basic financial principles. Zooming in on specific skills, almost all respondents are able to do simple interest rate calculations, but many have difficulty to understand the basic principles of portfolio diversification and risk reduction.

[19] Respondents were also able to refuse answering the question which they occasionally did. We consider these refusals as missing observations.

6.2 Debt literacy

As a good understanding of the basic economic principles may not be sufficient in case of complex mortgages, we have inserted a number of more specific questions in our survey to determine the respondents' understanding of debt contracts such as mortgages. In particular, we asked our respondents to answer the three questions developed by Lusardi and Tufano (2009). The authors refer to these questions as 'debt literacy' questions since they measure knowledge about debt contracts which is important when taking out a loan. Specifically, the debt literacy questions measure the understanding of compound interest, the time value of money, and ability to distinguish between different payment methods. The original questions focus mainly on credit card debt, which is common in the US, but virtually non-existent in the Netherlands. We rephrased the questions slightly and refer to a personal loan from a bank instead of owing credit card debt. The questions are as follows (the correct answers are in bold):

1. Suppose you take out a 1,000 euro personal loan from a bank and the interest rate you are charged is 20% per year compounded annually. If you did not pay anything off, at this interest rate, how many years would it take for the amount you owe to double? i) 2 years **ii) Less than 5 years** iii) 5 to 10 years iv) More than 10 years v) Do not know.

2. Suppose you take out a 3,000 euro personal loan from a bank. You pay a minimum payment of 30 euro each month. At an Annual Percentage Rate of 12% (or 1% per month), how many years would it take to eliminate your personal loan debt if you made no additional new charges? i) Less than 5 year ii) Between 5 and 10 years iii) Between 10 and 15 years **iv) Continue to be in debt** v) Do not know.

3. You purchase an appliance which costs 1,000 euro. To pay for this appliance, you are given the following two options: a) Pay 12 monthly installments of 100 euro each; b) Borrow at a 20% annual interest rate and pay back 1,200 euro a year from now. Which is the more advantageous offer? i) Option (a) **ii) Option (b)** iii) They are the same iv) Do not know.

The frequency of correct responses to these questions is reported in the first panel of Table 6. The first two questions invite the respondents to calculate the balance reduction of a loan in which the interest is compounded. At first sight, these questions are somewhat similar to the first financial literacy question. The debt literacy questions, however, refer to loan contracts instead of saving accounts; the specific context, as well as the more advanced skills to solve the questions, makes them more complex. The proportion of correct answers on both questions is much lower compared to the basic literacy question on interest compounding. The first and second debt literacy question are correctly answered by 66.9 and 48.3 percent of the respondents respectively. The results differ somewhat from the results documented by Lusardi and Tufano (2009) for the US, who report that both the first and second question are answered correctly by about one third of the respondents.[20] The lower score for the US is noticeable in light of the much higher experience with consumer debt, in particular credit card debt, and suggests the

[20] Disney and Gathergood (2013) report comparable results to the Netherlands for the UK with respects to the first two debt literacy questions. They do not use the final debt literacy question.

understanding of loans does not automatically improve by experience.[21]

The third debt literacy question shows that the concept of the time value of money is poorly understood: only 12.1 percent of the respondents answer correctly that it is advantageous to defer payment by one year. Table 7 provides the distribution of responses in the different answer categories for this question. About half of the respondents indicate that both payment schemes are similar; thereby overlooking the fact that one can earn interest over the money by deferring payment. A relatively large share of the respondents (about one-third) misinterpret the most expensive option for the most attractive choice. It seems that respondents were quite confident about their answer, as the number of answered 'do not know's' is relatively low (12.6%). The lack of knowledge for the third question is also found by Lusardi and Tufano (2009) for the US where about 7 percent of the sample provides the correct answer. Li et al. (2013) find a very similar ranking, with respect to the performance on both the debt literacy and financial literacy questions, as in our sample.[22]

Only 8.6 percent of the respondents answered all three debt literacy questions correctly, while 36.8 percent answered two questions correctly. The debt literacy questions indicate that individuals may be able to make simple interest calculations, but have difficulty to grasp more complex loan decisions.

Table 6 (bottom panel) shows the distribution of the number of correct answers to all six financial literacy questions combined. 7.3 percent of the individuals answer all six questions correct and 25.2 percent of the individuals have one incorrect answer while more than 20 percent of the individuals answer more than half of the questions incorrect. Thus, there is considerable variation in the level of financial sophistication between individuals. This is helpful for analyzing the association between financial literacy and mortgage risks.

To get a better understanding of the high amount of incorrect responses on the debt literacy questions we examine whether individuals who score well on the basic financial literacy questions perform well on the more specific debt literacy questions, and vice versa. First, we compare the distribution of correct debt literacy answers conditional on the number of correct answers on the basic financial literacy question. Panel A of Table 7 shows that individuals who have a perfect score on the basic literacy questions perform much better on debt literacy questions as well. More than half of the individuals who have a perfect score on the basic financial literacy questions answer two or three debt literacy question correct, compared to only one-third for those with two correct answers and 13.6 percent for respondents who provided one correct basic literacy answer. The strong association between the number of correctly answered basic literacy and debt literacy questions is confirmed by the Pearson chi-squared test statistic, which rejects the null-hypothesis of no association between both variables.

Panel B of Table 7 shows a cross tabulation of the number of correctly answered financial literacy questions and the answers provided to the third debt literacy question about the time

[21] Christelis et al. (2013) show that consumer credit, such as private loans and credit card debt, is held by more than 60 percent of the households in the US while the prevalence of consumer credit is around 40 percent in the Netherlands.

[22] In the empirical analysis we perform a sensitivity analysis where we also attach weights to persons who do not give a complete wrong answer to the third debt literacy question. These persons answered that both offers are the same (i.e. answer category iii). This does not affect the results for the relationships between debt literacy and mortgage risks.

value of money which is poorly understood. This question is answered correctly only by 17.3 percent of the respondents with a perfect score on the financial literacy questions. It thus seems that even individuals with a good understanding of basic financial concepts often overlook the fact that money earns interest. Financially literate persons are, however, less likely to give a completely wrong answer compared to individuals who are financially less capable. About 52.2 percent of the individuals with a perfect basic financial literacy score indicate that both payment schemes are similar and 27.8 percent confuse the most expensive and most favorable payment scheme—which we consider a 'completely wrong' answer. The number of respondents who give a completely wrong answer as well as the proportion of 'do not know' responses is much higher for individuals who are financially less capable.

6.3 Debt literacy and personal characteristics

Table 8 shows the distribution of the number of correct debt literacy questions across socioeconomic characteristics. Respondents who are younger, higher educated, male or homeowner have a higher debt literacy score. Alessie et al. (2011) report similar results for the financial literacy questions. The Pearson chi-squared test statistics show that debt literacy differences among gender, age, education and homeownership are highly significant. For the relationship between age and debt literacy we observe an inverted U-shaped pattern of the average number of correctly answered questions. This is consistent with the findings for actual credit loan decisions for the US by Agarwal et al. (2009) and other studies on investment decisions.[23] While we cannot disentangle age and cohort effects based on these cross-sectional results, the typical interpretation of the better literacy scores among middle aged individuals (age 40 to 49 years) is that, compared to younger generations, they have more experience with debt, but the number of correct answers declines as individuals grow older and cognition declines.

We have asked the survey participants to assess their financial knowledge and their ability to take out a mortgage without professional advice.[24] Respondents seem quite well aware of their level of financial sophistication (Table 9). More than 20 percent of the individuals who consider themselves well able to originate a mortgage loan without professional advice have three correct debt literacy answers, while only 3 percent of the persons who state that they are not able to originate a mortgage without advice have a perfect score on the debt literacy questions. We find a similar pattern with respect to self-assessed financial knowledge. More experienced home buyers have a better understanding of debt contracts than first-time homeowners which is consistent with the increasing part of the inverted U-shaped relation of debt literacy with age.

6.4 Debt literacy and financial advice

Do less experienced homeowners or financially less sophisticated persons ask professional advice or do they use other sources of information to make a more informed mortgage choice? Table 10 reports the sources of information borrowers use when they purchase a house. The majority of the sample considers the advice of the mortgage lender (49.4%) or an independent mortgage

[23] For example, Korniotis and Kumar (2011) show that the effect of cognitive decline on investment skills dominates the role of experience.

[24] Self-assessed financial literacy is taken from the DHS module on Economic & Psychological concepts of saving.

broker (54.4%) as the most important source of information when purchasing a house. The advice from family and friends (29.4%) or the Internet (27.4%) are other important sources of information as well. Individuals with more financial knowledge often use information from financial magazines and books (20.8% percent) or other published sources—such as newspapers (9.3 %), brochures (11.2%) and the Internet (36.6%)—to acquire information rather than to rely on the advice of experts only. Thus financially sophisticated borrowers typically gather additional information before deciding on the best option instead of relying on professional advisors only. This way, financially capable borrowers are less prone to potential biased financial advice.

We do not find that individuals with a lower level of debt literacy are more likely to consult a professional financial advisor instead of buying a mortgage directly through a bank or lender.[25] Similarly, there is no systematic tendency among less debt literate individuals to cite family or friends as an important source of information than more knowledgeable individuals: respondents who answer all debt literacy questions incorrectly mention family or friends the least often as an important source of advice (while respondents who answer one question correctly most often state that advice of family and friends is important).

These findings are different than those found for other less complex financial decisions, such as investing in the stock market. Several studies document that for investment decisions, households with a higher financial literacy (Van Rooij et al., 2011) or education (Hackethal et al., 2012) are more likely to consult professional advice. Van Rooij et al. (2011) find that individuals with a lower level of financial literacy more often rely on family or friends as a source of information, while individuals with higher financial literacy more often rely on advice from a professional. Thus for mortgage choice, unlike other less complex financial decisions such as stock market participation, there is no systematic relationship between financial sophistication and seeking professional advice or information from family or friends. However, more sophisticated individuals use more sources of advice to make an informed decision.

In contrast, we find a strong relationship between the source of advice and the self-assessed ability to take out a mortgage without professional advice: only one-third of the respondents who consider themselves well able to originate a mortgage without advice rely on professional advice while more than two-third of the respondents who are unconfident about their ability to take out a mortgage, seek professional advice.[26] Similarly, respondents with a low self-reported ability to take out a mortgage are more likely to consult family or friends. This finding is confirmed by a survey about the adequacy of information and advice among consumers who recently purchased a financial product by the Financial Services Authority (Finney and Kempson, 2008). The FSA survey finds that households with a low level of self-reported financial confidence are more likely to seek financial advice or consult family and friends compared to their confident counterpart.

[25] There is also no statistical evidence that borrowers with a lower debt literacy more often originate a mortgage through a financial intermediary. Regardless of the level of literacy, somewhat less than half of the mortgage owners originate their mortgage directly at the lender without the intervention of an intermediate broker or advisor.

[26] Results are not reported but available upon request.

7 Results on financial literacy and mortgage risks

7.1 Financial literacy and perceived risk of different mortgage terms

Are borrowers well aware of their mortgage risks? The perceived risk associated with the mortgage loan might not be consistent with the true underlying risk. Individuals who are financially more sophisticated or individuals who take out a mortgage through a mortgage broker may characterize their mortgage as more risky, not because they own more risky mortgages but simply because they are better informed about the risks. To examine this question, we asked the homeowners in our sample to rate the riskiness of six different mortgage features on a seven point scale: from 1 corresponding to 'no risk at all' to 7 corresponding to 'very risky'. The six features are: short-term fixed interest rate; high loan-to-value ratio; substantial mortgage expenses in relation to household income; interest-only mortgage; investing part of the mortgage payments in the stock market; an adjustable rate mortgage (ARM).

The first column of Table 11 shows the average perceived riskiness for the different mortgage risk factors. Most mortgage owners perceive a high loan-to-value ratio, a high payment-to-income rate and having an investment mortgage as risky. The relatively low perceived risk of adjustable rate mortgages is consistent with the findings by Bucks and Pence (2008) who show that households underestimate the extent to which ARM rates can rise. The risk of investment mortgages can be considered as common knowledge, because these mortgages received much coverage in the media and many of these products incurred large investment losses after the burst of the dot-com bubble in the years 2001 to 2003 and in the years after the fall of Lehman Brothers in September 2008. In this respect, it is remarkable that, having an interest-only mortgage is considered as the least risky feature out of the six mortgage features asked, since Dutch authorities have frequently stressed their riskiness. On the other hand, survey questions on house price expectations reveal that most borrowers were expecting house price increases at the time of the survey. Moreover, the risk of an interest-only mortgage is limited if individuals have substantial equity in their home. Many households indeed indicate that a large drop in house prices does not lead to financial problems because they have substantial equity in their house (as discussed in the section about measuring mortgage risks).

The next two columns of Table 11 show the association between financial literacy and perceived riskiness of the different mortgage features. The reported coefficients are derived from ordered probit models with the perceived riskiness as the dependent variable and the financial literacy measure as the independent variable. Socioeconomic characteristics, experience on the housing market and risk- and time preferences are included as control variables.[27] The results show that more debt literate individuals consider a large mortgage loan in relation to the value of the house (LTV) (as well as high mortgage expenses) as more risky. The same holds for individuals with a higher basic financial literacy. Moreover, individuals with higher debt or basic financial literacy consider investment based mortgages more risky than less literate individuals,

[27]To proxy for risk preferences persons are asked to rate the question: "I am prepared to take the risk to lose money, when there is also a chance to gain money," from 1 corresponding to risk averse to 7 corresponding to risk tolerant. As an indicator of time preferences persons are asked to answer the question: "Which of the time-horizons mentioned below is in your household most important with regard to planning expenditures and savings?" The answer category 1 corresponds to a short time horizon and 5 corresponds to a long time horizon of more than ten years from now.

though this association is insignificant for the debt literacy measure.

7.2 Financial literacy and features of the mortgage

Do differences in risk perception of mortgage features across different levels in literacy go hand in hand with different mortgage products hold by more and less literate mortgage owners? We perform regression analysis to investigate whether financial literacy is related to mortgage choices.

Table 12 shows the estimated coefficients of a linear regression for a number of mortgage feature as the dependent variable and the financial literacy measure as the independent variable. The regression model contains the same control variables as before. Borrowers with higher levels of debt literacy take out mortgages with significant lower LTV ratios and LTI ratios at the time they buy the house and originate the mortgage. For basic financial literacy, we find that more literate borrowers have mortgages with significantly lower current LTV and current LTI values.

Table 13 shows the marginal effects from a multinomial regression model of the mortgage type on financial literacy. After controlling for socioeconomic characteristics, expectations and risk an time- preferences we find that respondents with higher financial literacy are less likely to have the traditional fully amortizing mortgages.[28] We do not find a relationship between financial literacy and having a mortgage with an adjustable rate (ARM) versus a fixed rate (FRM).

7.3 Financial literacy, mortgage risks and financial advice

Do individuals with lower financial literacy have riskier mortgages? To better understand the relation between financial literacy and the riskiness of the mortgage we use the measure of overall riskiness of the mortgage contract. We have shown that this measure is strongly correlated with the risky features of a mortgage loan, such as the LTV ratio and LTI ratio. This measure may, however, lead to biased results if the judgments about the riskiness of the own mortgage loan is not comparable across respondents. A lack of comparability between respondents results in measurement error, which may result in an underestimation of the association between financial literacy and mortgage risks. To deal with this issue we follow a two-step procedure. We first estimate an ordered probit regression on the self-reported overall riskiness of the mortgage contract as a function of objective 'risky' features associated with the mortgage loan. We use the predicted risk from this regression to create an objective measure of individual risk of the mortgage loan, which we will relate to several measures of financial literacy in the second step.

Table 14 shows estimates of an ordered probit regression of the self-assessed risk of the mortgage loan. The dependent variable is coded 0 for 'no risk at all' 1 for 'hardly risky' and 2 for 'somewhat (or very) risky'. The first column shows the estimated coefficients for a specification which does include the financial features of the mortgage loan, but no information about the type of mortgage. Respondents with a higher current loan-to-value ratio or a higher mortgage

[28] Similarly, respondents with higher self-assessed ability to take out a mortgage (without professional advice) more often have interest-only mortgages but are less likely to own endowment mortgages. In the same way, respondents with higher self-reported financial knowledge more often own interest-only mortgages, but the ownership of traditional full amortization mortgages is less common among these respondents (results available upon request).

payments to net-income ratio are more likely to consider their mortgage as risky. The second specification includes dummy variables for having an ARM and for the type of mortgage, where having an interest-only mortgage is the baseline. Respondents who have an investment based mortgage consider their mortgage more risky and respondents with traditional fully amortizing mortgages find the mortgage less risky (conditional on the financial features of the mortgage loan). Those who have an adjustable rate mortgage assess their mortgage as more risky. We did not include a variable for having a mortgage which is insured by the NMG as this variable appears insignificant in all specifications.

We use the estimates of the final specification to predict the mortgage risk based upon the features of the mortgage loan which provides a more objective risk measure compared to the subjective risk perception provided by home owners for their own mortgage. Figure 1 shows the distribution of predicted mortgage risk for every household. We use this measure of mortgage riskiness as the dependent variable in a multivariate regression to test whether financial literacy is related to mortgage risks.

The first part of Table 15 shows the regression coefficients for debt literacy. The first column shows that debt literacy is positively associated with mortgage risk at the 1% significance level. The positive coefficient implies that individuals with a higher debt literacy have riskier mortgages. The coefficient of debt literacy reduces after controlling for socioeconomic characteristics, such as educational level, age, gender, marital status and having children, but remains significant (specification 2).

The next regression adds controls for mortgage advice (specification 3). Controlling for sources of information in taking a mortgage, the regression estimates show that borrowers who receive advice from a mortgage broker have riskier mortgages. Indeed, it makes sense for those who plan to take out a more risky loan with perhaps more complex features to go to an independent mortgage advisor. On the other hand, worries about commission structures in which advisors get paid by lenders based on the mortgage amount and type of mortgage taken out have recently led to a ban on commissions paid by lenders by the supervisory authority (AFM).

We have interacted the dummy variables for financial advice with the financial literacy measure. A significant coefficient on the interaction term suggests a differential effect of financial advice for households with different levels of financial literacy. The interacted variables are centered such that the coefficients on these variables can be interpreted as partial effects. The results show that financial professional financial advice results in riskier mortgages for less-debt literate households (see Table 15, specification 3). Similarly, less-debt literate borrowers who emphasize the importance of mortgage advice from family and friends have riskier mortgages.

Next, the regression is extended by accounting for the perceived riskiness of different terms of the mortgage loan, past experience on the housing market and risk and time preferences. In the previous subsection, it appeared that financially more sophisticated individuals perceive several features of the mortgage loan as more risky, which may influence mortgage choice. We derive the measure of the overall perceived risk of a mortgage loan by performing a factor analysis on the perceived riskiness of the six different features of a mortgage loan. The results in specification 4 show that perceived mortgage risk is an important determinant of the riskiness of the actual

mortgage loan. The positive coefficient implies that individuals who perceive various features of a mortgage loan, such as a high loan-to-value ratio or an investment based mortgage, as more risky have less risky mortgages. The inclusion of these controls does not affect the discussed coefficients.

The final specification includes controls for income risk and wealth risk. The regression estimates show that individuals who take out risky mortgages more often expect to encounter financial problems when house prices decline or earnings losses occur.[29]

Table 16 shows the same set of estimation results for financial literacy. The first specification shows that financial literacy is also positively correlated with mortgage risk. The magnitude of the estimated coefficient is very similar to the coefficient of debt literacy. However, the effect of financial literacy on mortgage risk is not statistically significant. Thus, the literacy measure that explicitly zooms into knowledge about debt, seems a more accurate predictor of mortgage debt decisions than the overall measure of financial literacy. This is consistent with the research by Gerardi et al. (2013) who find that numerical ability—the ability to make 'more advanced' computations—affects default behavior among US homeowners, while basic financial literacy is of less importance for default. Similarly, Disney and Gathergood (2013) find that individuals who provide a correct answer to the debt literacy questions are less confused by financial concepts and more confident about financial decisions; while they do not find a strong significant relationship for the basic literacy question in their questionnaire.

8 Discussion

It is well known that a large group of households lacks basic financial knowledge and does not possess the financial skills to take complex decisions (Campbell, 2006). Our results highlight that the level of knowledge of loan products is lower than the knowledge of basic financial concepts suggesting that debt decisions are in particular complex (see also Lusardi and Tufano, 2009). As basic financial knowledge alone is not sufficient to understand more complex products as loans, it is important that financial education initiatives set-up by many governments include special modules or pay attention to the specifics of debt decisions.

A large number of countries witnessed housing busts in the aftermath of the financial crisis (including well developed countries with a highly educated population as the US, the UK, Spain, Ireland and the Netherlands) which has demonstrated how mortgage choices may turn into a serious financial burden. Mortgage owners became distressed because they could not longer afford their mortgage payments or their debt exceeded the underlying value of their home. According to our results, homeowners generally seem well aware of the characteristics that increase the financial risks of a mortgage. Nevertheless, more knowledgeable households tend to take out mortgages with relatively higher risk levels being aware that they are exposed to income and wealth risk. In fact, financial literacy seems to be a blessing as well as a curse. It helps individuals entering the stock market and plan for retirement, but it also stimulates households to choose mortgages with risky characteristics that have put a lot of households in distress. Moreover, these developments negatively impacted the macro consumption expenditures and

[29] We performed a sensitivity analysis where we also attach weight to persons who do not give a 'complete wrong' answer to the third debt literacy question (i.e. answer category iii). This does not alter the results.

deepened the economic downturn as households who have problem in paying the mortgage or felt uncomfortable with negative equity reduced their expenditures.

Given the complex nature of loan decisions, many households use professional advice or base their decision on other sources of information. Homeowners with more financial knowledge typically consult a larger number of information sources (e.g. financial magazines, newspapers and the Internet). While one may expect that financially illiterate homeowners more often consult a professional advisor, this does not seem to be the case. This is consistent with the argument that financial advisors are used by those who need them the least (Hackethal, Haliassos and Jappelli, 2012). However, our results do show that homeowners who consult advisors have more risky mortgages, independent of their level of literacy being high or low. Nevertheless, the impact of advisors on the riskiness of the mortgage loan is somewhat less for the more literate consumers. While we are not able to address the issue of causality as it could be that those homeowners planning to take a more risky mortgage go to an advisor, the results do highlight the importance of independent financial advice and a commission structure that does not contain incentives to advise risky mortgages when they are less adequate.

For these reasons, several countries are changing the legal rules for fee structures in the market of professional advice. The Dutch government for instance has prohibited the commission to intermediaries for the origination of mortgages as from January 2013.[30] Consumers now have to pay the advisor directly for all services. This type of commission structures reduces worries about mortgage advisors having incentives to give advice which is not in line with the interest of the consumer; see also Inderst and Ottaviani (2012) and Gorter (2012) for a discussion about the effectiveness of prohibiting commissions for the choice of financial products. This may result in the advice and origination of more conservative mortgages and consequently less households with financial problems. On the other hand, high brokerage fees, may discourage homeowners to gather financial advice. Although, it is not clear in advance that homeowners will display the same behavior in the new setting, it is somewhat comforting that in the past consumers with low literacy levels who did not consult financial advisors have taken out less complex and more conservative mortgages.[31]

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[30] At the same time the government introduces a number of measures that reduce the risk level of new mortgages, including a tax system that strongly encourages the take up of annuity or linear mortgages and the introduction of a cap on the maximum LTV which is reduced gradually from 105% in 2013 to 100% in 2018.

[31] As a remedy, policymakers may consider making financial advice mandatory for unsophisticated households or for households who plan to take out a risky mortgage product. However, the first empirical evidence shows that making financial advice mandatory does not affect financial behavior among less sophisticated households (Hung and Yoong, 2013), while it discourages the take out of risky mortgages for those households willing to avoid mandatory counseling (Agarwal et al., 2014). While overall this is helpful for reducing mortgage risks for homeowners, it puts a tax on those homeowners who are quite capable of taking a mortgage decision on their own.

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Tables and figures

Table 1: Financial features of the mortgage loan across mortgage loan durations and age groups

		LTV ratio		LTV ratio > 100%		LTI ratio		
	N	OLTV	CLTV	OLTV	CLTV	OLTI	CLTI	CPTI
Panel A. Year of purchase of the house								
After 2007	44	1.03	0.85	67.3	25.2	9.08	5.89	0.57
2004 to 2007	98	0.96	0.81	53.0	16.8	8.88	5.72	0.51
2000 to 2003	63	0.90	0.67	41.5	5.90	5.60	4.04	0.39
1996 to 1999	69	0.92	0.49	43.1	0	6.23	3.31	0.35
1990 to 1995	91	0.94	0.36	25.0	1.81	.	2.35	0.27
Before 1990	166	0.87	0.28	17.5	0.47	.	2.42	0.26
Panel B. Year taken out the mortgage								
After 2007	61	1.00	0.77	57.1	19.6	9.18	5.21	0.49
2004 to 2007	167	0.97	0.72	47.6	12.6	8.63	5.07	0.46
2000 to 2003	82	0.90	0.55	35.5	3.34	4.93	3.60	0.34
1996 to 1999	82	0.89	0.43	34.6	0	6.64	3.03	0.34
1990 to 1995	61	0.91	0.28	19.4	0	.	1.78	0.25
Before 1990	78	0.82	0.21	15.6	1.06	.	1.88	0.24
Panel C. Age groups (household head)								
Above age 70	72	0.75	0.26	11.8	0	6.01	2.36	0.23
Age 60 to 69	126	0.87	0.40	22.9	0.59	6.39	3.10	0.32
Age 50 to 59	136	0.89	0.45	30.4	1.24	6.13	3.20	0.33
Age 40 to 49	107	0.97	0.61	45.4	6.65	9.06	4.14	0.43
Below age 40	90	1.03	0.82	62.1	22.6	8.81	5.23	0.47
Mean		0.93	0.55	38.1	7.30	7.97	3.80	0.38

Notes: (N=531). Panel A displays the average value of the mortgage measures by year of purchase of the house (for the head of the household). The construction and definition of these measures is described in Section 4.2. For the variable OLTI the number of observations is lower because income at time of mortgage origination is not available for all households (N=170). Panel B provides the same statistics by year of purchase of the current (first) mortgage. This period is different from the year of purchase of the house if the original mortgage is refinanced. Panel C displays the mean value of financial characteristics of the mortgage loan for different age groups. The statistics are weighted averages.

Table 2: Mortgage types across mortgage loan durations and age groups

	N	Mortgage type (percent)					ARM	Refinanced
		Full amortization	Endowment	Interest-only	Investment based	Other		
Panel A. Year of purchase of the house								
After 2007	44	1.15	41.5	45.8	3.32	8.21	6.97	4.73
2004 to 2007	98	4.77	32.4	45.8	8.66	8.35	1.60	6.21
2000 to 2003	63	4.85	22.5	45.7	22.1	4.86	12.2	30.8
1996 to 1999	69	1.27	45.4	34.8	17.6	0.82	4.78	28.3
1990 to 1995	91	11.6	36.5	40.9	11.1	0	11.7	38.5
Before 1990	166	18.4	18.2	56.9	5.88	0.71	15.0	65.4
Panel B. Year taken out the mortgage								
After 2007	61	1.93	35.1	54.9	2.59	5.50	8.75	26.5
2004 to 2007	167	3.43	25.0	53.5	10.4	7.70	5.68	39.6
2000 to 2003	82	7.56	20.5	48.2	22.6	1.13	12.9	38.3
1996 to 1999	82	3.18	35.6	43.4	17.1	0.72	5.19	37.1
1990 to 1995	61	12.1	54.0	29.0	4.86	0	5.82	14.8
Before 1990	78	35.7	28.9	32.9	2.54	0	22.2	21.7
Panel C. Age groups (household head)								
Above age 70	72	19.7	2.34	77.2	0.78	0	13.1	45.1
Age 60 to 69	126	13.4	9.90	67.5	8.62	0.59	9.55	47.4
Age 50 to 59	136	7.72	29.4	47.7	12.8	2.40	15.1	37.6
Age 40 to 49	107	4.16	42.5	35.2	14.6	3.55	5.52	25.3
Below age 40	90	4.54	50.9	24.9	11.1	8.48	3.87	16.7
Mean		8.41	31.1	46.1	10.8	3.52	8.97	32.5

Notes: (N=531). Panel A displays the percent of households who originated a type of mortgage by year of purchase of the house (for the head of the household). The five mortgage types are mutually exclusive and refer to the first mortgage. A description of the different mortgage types is given in Section 3. The final two columns of panel A reports the average share of households who have a adjustable rate mortgage (ARM) and who refinanced their mortgage respectively. "Refinanced" is defined as households who took out a mortgage some time after the purchase of the house. The same statistics are reported by year of origination of the current mortgage (panel B) and across five age groups (panel C). The statistics are weighted averages.

Table 3: Response frequency regarding the perceived riskiness of the own mortgage contract

Overall riskiness (of the mortgage contract)	Very risky	Some-what risky	Hardly any risk	No risk	Do Not Know
	1.8	27.0	46.3	21.2	3.7
Income risk - Difficult to pay mortgage expenses under adverse unforeseen circumstances?	Yes	No			Do Not Know
	64.6	31.4			4.1
Wealth risk - Financial problems after a large house price decline?	Yes	No			Do Not Know
	25.7	62.9			11.4
No financial problems[a]					
Substantial equity in my house	86.2				
Sufficient net worth to set off the losses	20.8				
Financial problems[a]					
Not enough funds to pay off the mortgage at maturity	57.4				
Results in inadequate savings to support retirement	11.2				
Results in financial strain	16.9				
Unable to move to another house	27.6				
Other	4.5				

Notes: (N=930). The questions are asked to all household members who have a residential mortgage on their property (748 households). We have 97 missing observations for the question regarding income risk as these individuals did not participate in the DHS module on Accommodation and Mortgages. The statistics are weighted averages. [a] Does not sum to a hundred percent because respondents may provide multiple answers.

Table 4: Perceived riskiness of the mortgage contract versus financial characteristics of the mortgage

		Overall riskiness			Income risk		Wealth risk	
	Mean	Some-what risky	Hardly any risk	No risk	Yes	No	Yes	No
Current LTV								
Low	0.16	9.6	45.9	44.5	36.3	63.7	6.9	93.1
Intermediate	0.46	29.7	49.3	21.0	67.0	33.0	14.2	85.8
High	0.91	42.4	48.1	9.5	87.7	12.3	52.2	47.8
Pearson χ^2 test:		p-value = 0.00			p-value = 0.00		p-value = 0.00	
Current LTI								
Low	1.25	8.2	50.1	41.7	41.6	58.4	7.8	92.2
Intermediate	3.24	32.4	46.7	20.9	64.8	35.2	17.5	82.5
High	6.57	42.0	47.4	10.7	87.0	13.0	51.8	48.2
Pearson χ^2 test:		p-value = 0.00			p-value = 0.00		p-value = 0.00	
Current PTY								
Low	0.14	12.1	50.6	37.3	44.5	55.5	10.3	89.7
Intermediate	0.32	25.7	52.2	22.2	67.5	32.5	26.3	73.7
High	0.63	44.4	42.6	13.0	82.7	17.3	41.5	58.5
Pearson χ^2 test:		p-value = 0.00			p-value = 0.00		p-value = 0.00	

Notes: (N=680). The construction and definition of these measures is described in Section 4.2. The measures are reported for the members of the households for which all mortgage characteristics are available. The first column presents per quantile the average value of the financial measures of the mortgage. The other columns contain percentages. For every risk measure we consider the few 'Do not know' answers as missing observations. The statistics are weighted averages.

Table 5: Perceived riskiness of the mortgage contract versus features of the mortgage and process of origination

		Overall riskiness			Income risk		Wealth risk	
	Mean	Some-what risky	Hardly any risk	No risk	Yes	No	Yes	No
Mortgage type								
Full amortization	9.1	10.9	36.5	52.5	54.1	45.9	15.0	85.0
Endowment	30.9	22.5	60.2	17.3	77.7	22.3	31.3	68.7
Interest only	45.4	28.0	47.0	25.0	58.8	41.2	24.5	75.5
Investment	10.2	71.7	21.6	6.6	80.5	19.5	33.2	66.8
Other mortgage	4.5	35.7	53.1	11.2	80.5	19.5	53.8	46.2
Pearson χ^2 test:		p-value = 0.00			p-value = 0.00		p-value = 0.04	
Adjustable rate mortgage (ARM)								
No	91.9	29.2	48.5	22.3	67.9	32.1	28.0	72.0
Yes	8.2	34.0	41.0	25.0	61.7	38.3	26.9	73.1
Pearson χ^2 test:		p-value = 0.62			p-value = 0.38		p-value = 0.87	
National Mortgage Guarantee (NMG)								
No	66.8	30.1	45.3	24.6	64.6	35.4	26.0	74.0
Yes	33.2	28.6	53.1	18.4	73.2	26.8	31.9	68.1
Pearson χ^2 test:		p-value = 0.21			p-value = 0.05		p-value = 0.21	

Notes: (N=680). The features of the mortgage contract are reported for the members of the households for which all mortgage characteristics are available. The first column presents the frequency for each mortgage type or category. The other columns contain percentages. A description of the different mortgage types is given in Section 3. For every risk measure we consider the few 'Do not know' answers as missing observations. The statistics are weighted averages.

Table 6: Percentage of correct and incorrect financial literacy and debt literacy questions

Panel A. Percentage of correct answers

	Debt literacy questions			Financial literacy questions		
	1	2	3	1	2	3
Correct	66.9	48.3	12.1	90.7	84.6	58.1
Incorrect	21.0	35.7	76.7	3.2	6.0	11.5
Do not know	12.1	16.0	11.2	6.1	9.4	30.4

Panel B. Number of correct answers

	None	1	2	3	4	5	6	Mean
Financial literacy	6.1	6.9	34.6	52.5	.	.	.	2.3
Debt literacy	24.6	32.1	34.7	8.6	.	.	.	1.3
Debt & fin. literacy	4.9	4.2	12.7	19.9	25.8	25.2	7.3	3.6

Notes: The first part of Panel A shows weighted percentages of correct debt literacy questions for all respondents of the questionnaire (N=1,465). The final three columns report the distribution of answers to the financial literacy questions which where asked in a separate module. This module was answered by more than 90 percent of our sample (N=1,324). Panel B displays the weighted number of correct answers for both separate modules and all six questions combined (N=1,324). The statistics are weighted averages.

Table 7: Debt literacy versus financial literacy

	Number of correct answers for financial literacy				
	None	1	2	All	Mean
Panel A. Number of correct answers for debt literacy					
None (n=353)	80.6	47.2	28.3	12.1	1.72
1 (n=442)	15.3	39.2	36.4	29.7	2.35
2 (n=430)	4.1	13.6	29.6	44.4	2.63
All (n=99)	0.0	0.0	5.6	13.9	2.79
	Pearson χ^2 statistic: $F(8.76, 11595.1) = 22.76$, p-value = 0.00				
Panel B. Answers debt literacy Question 3.					
Option (a) (n=407)	13.8	41.4	31.9	27.8	2.34
Option (b) (n=145)	0.0	1.4	9.5	17.3	2.72
They are the same (n=625)	15.0	39.0	47.5	52.2	2.48
Do not know (n=147)	71.2	18.2	11.0	2.7	1.21

Notes: (N=1,324). The statistics are weighted averages. The Pearson chi-squared statistic is corrected for the use of sample weights with the correction of Rao and Scott (1984). The statistic is converted to a F statistic to get a valid p-value.

Table 8: Debt literacy and demographics

	Number of correct debt literacy answers				
	None	1	2	All	Mean
Age classes					
Above age 70 (n=249)	42.4	35.5	18.8	3.3	0.83
Age 60 to 69 (n=362)	27.1	32.9	33.0	7.0	1.20
Age 50 to 59 (n=353)	21.2	30.0	41.0	7.7	1.35
Age 40 to 49 (n=261)	19.2	30.2	37.1	13.5	1.45
Below age 40 (n=240)	19.2	32.9	38.3	9.6	1.38
	Pearson χ^2 statistic: $F(11.01, 16124.0) = 4.86$, p-value = 0.00				
Gender					
Men (n=788)	18.7	29.3	37.9	14.0	1.47
Women (n=677)	30.7	35.1	31.3	2.9	1.06
	Pearson χ^2 statistic: $F(2.97, 4352.0) = 19.1583$, p-value = 0.00				
Education level					
Master degree (n=197)	5.9	24.0	51.4	18.7	1.83
Bachelor degree (n=408)	18.3	29.2	41.2	11.3	1.45
Secondary (n=404)	26.2	36.5	32.0	5.3	1.16
Primary (n=456)	41.4	36.2	19.9	2.5	0.84
	Pearson χ^2 statistic: $F(8.79, 12870.9) = 16.0531$, p-value = 0.00				
Homeownership status					
Tenant (n=374)	33.3	37.9	24.3	4.5	1.00
Homeowner (n=1,091)	21.5	30.1	38.4	10.0	1.37
	Pearson χ^2 statistic: $F(2.93, 4289.1) = 10.3986$, p-value = 0.00				

Notes: (N=1,465). The statistics are weighted averages. The Pearson chi-squared statistic is corrected for the use of sample weights with the correction of Rao and Scott (1984). The statistic is converted to a F statistic to get a valid p-value.

Table 9: Debt literacy versus self-assessed knowledge and experience

	Number of correct debt literacy answers				
	None	1	2	All	Mean
Self-assessed ability to originate a mortgage without advice					
Well able (n=171)	13.4	18.4	46.5	21.7	1.76
Able (n=316)	16.6	27.1	45.4	10.9	1.51
More or less able (n=298)	18.9	37.1	34.1	9.9	1.35
Poorly able (n=314)	24.5	33.5	37.5	4.5	1.22
Not able (n=133)	34.2	37.5	25.3	3.0	0.97
Do not know (n=51)	60.8	23.0	12.8	3.4	0.59
	Pearson χ^2 statistic: $F(17.12, 25067.7) = 7.55$, p-value = 0.00				
Self-assessed financial knowledge					
Very knowledgeable (n=40)	17.0	18.0	40.9	24.2	1.72
Knowledgeable (n=291)	15.3	28.5	38.9	17.2	1.58
More or less knowledgeable (n=808)	24.8	34.1	34.7	6.5	1.23
Not knowledgeable (n=268)	33.1	32.5	31.5	2.8	1.04
	Pearson χ^2 statistic: $F(11.61, 16998.9) = 4.97$, p-value = 0.00				
Times moved to an owner occupied house					
Never (n=346)	33.5	37.1	24.5	4.8	1.01
1 time (n=561)	24.1	34.1	32.6	9.3	1.27
2 times (n=364)	21.1	26.7	42.0	10.2	1.41
3 times (n=129)	16.8	31.5	39.7	12.0	1.47
4 times or more (n=65)	13.8	20.3	59.0	6.9	1.59
	Pearson χ^2 statistic: $F(11.59, 16961.8) = 3.93$, p-value = 0.00				

Notes: (N=1,465). We have 182 missing observations for the ability to originate a mortgage without financial advice as this question is not asked to individuals who live in a rental home and report that they do not consider to buy a house (i.e. they strictly prefer to rent). We have 58 missing observations for self-assessed financial knowledge as these individuals did not participate in the DHS module on Economic & Psychological concepts of saving. The statistics are weighted averages. The Pearson chi-squared statistic is corrected for the use of sample weights.

Table 10: Financial advice versus debt literacy

	Number of correct answers					
	None	1	2	All	Total	p-value
What is your most important source of advice when you purchase a house?						
Parents, friends or acquaintance	22.5	33.2	31.4	25.4	29.4	0.24
Information from the newspapers	2.1	2.8	3.4	9.3	3.5	0.00
Financial magazines, guides, books	6.9	9.3	16.0	20.8	12.3	0.00
Brochures from my bank or mortgage advisor	6.4	7.7	7.3	11.2	7.6	0.99
Bank or other institution who provide the mortgage	41.7	49.5	55.3	43.4	49.4	0.27
Professional (independent) financial advisors	46.6	56.3	58.2	51.8	54.4	0.28
Advertisements on TV or in other Media	0.7	0.4	0.5	0.0	0.5	0.50
Financial computer programs	4.0	4.0	5.5	10.4	5.1	0.08
Financial information on the Internet	15.2	22.7	36.3	36.6	27.4	0.00
Other sources	5.1	4.3	6.2	8.0	5.5	0.22
Do not know	13.4	3.8	0.7	1.4	4.5	0.00

Notes: (N=1,283). The table reports the percentage of individuals who give importance to a specific source of information when purchasing a house stratified by the number of correct debt literacy answers. The percentages do not sum up to a hundred percent because persons indicate multiple sources as important. The final column report the p-values of a Pearson χ^2 test. The p-values have been adjusted to take into account that multiple tests are being conducted (Holm, 1979). This question is not asked to tenants without plans to purchase a house in the future (182 individuals).

Table 11: Financial literacy and perceived riskiness of different features of the mortgage loan: regression results

	Mean / Std. Dev.	Debt literacy	Basic financial literacy
Short fixed term	4.87	-0.029	-0.075
	(1.60)	(0.039)	(0.051)
High loan-to-value ratio	6.20	0.078*	0.129**
	(1.16)	(0.044)	(0.058)
High mortgage expenses	5.98	0.127***	0.074
	(1.20)	(0.042)	(0.054)
Interest-only mortgage	4.18	-0.060	-0.059
	(1.59)	(0.038)	(0.046)
Investment based mortgage	5.78	0.051	0.115**
	(1.34)	(0.042)	(0.057)
Adjustable rate mortgage (ARM)	5.00	-0.051	-0.008
	(1.36)	(0.039)	(0.051)

Notes: (N=1100). The first column shows the average perceived riskiness of different features of a mortgage loan. The perceived riskiness of a mortgage feature is answered on a response scale from 1 (no risk) to 7 (no risk at all). The remaining columns of the table show the association between financial literacy and perceived riskiness of different features of the mortgage loan. The coefficient is derived from an ordered probit model in which the perceived riskiness is the dependent variable and the financial literacy measure is the independent variable. The financial literacy measure is based on the number of correct answers. The control variables include: marital status, gender, age groups, education level, monthly household income (quartiles), homeownership status, having children, employment status, risk and time preferences and number of times moved to an owner occupied house. Clustered standard errors (on the household level) are within parentheses. Significant at the *** 1 percent; ** 5 percent; * 10 percent level.

Table 12: Financial literacy and financial mortgage attributes: regression results

	Debt literacy	Basic financial literacy
Current LTV	0.007	-0.035**
	(0.013)	(0.015)
Current LTI	0.080	-0.247*
	(0.105)	(0.141)
Current PTI	0.012	-0.014
	(0.010)	(0.014)
Original LTV	-0.033*	-0.019
	(0.017)	(0.021)
Original LTI	-0.647*	-0.217
	(0.378)	(0.453)

Notes: N=517. The table shows the association between financial literacy and several features of the mortgage loan. The correlation coefficient is derived from an OLS regression in which the mortgage feature is the dependent variable and the financial literacy measure is the independent variable. Controls: (see Table 11). Standard errors are within parentheses. Significant at the *** 1 percent; ** 5 percent; * 10 percent level.

Table 13: Financial literacy and mortgage type: regression results

	Debt literacy	Basic financial literacy
Full amortization	-0.026*	-0.037**
	(0.014)	(0.015)
Endowment	0.016	-0.008
	(0.021)	(0.026)
Interest-only	0.012	0.046
	(0.024)	(0.030)
Investment based	0.001	0.004
	(0.014)	(0.019)
Adjustable rate mortgage (ARM)	0.013	-0.025
	(0.015)	(0.021)

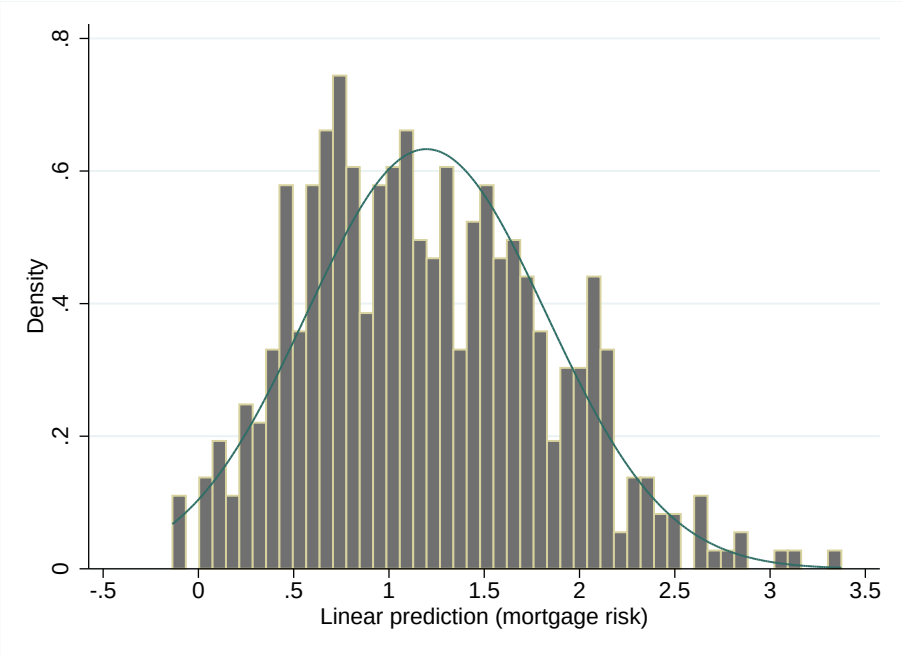
Notes: N=517. The table shows the association between financial literacy and several features of the mortgage loan. The correlation coefficient is derived from a OLS regression (ARM) and a multinomial logit regression (mortgage type) in which the mortgage feature is the dependent variable and the financial literacy measure is the independent variable (the marginal effects are reported). Controls: (see Table 11). Standard errors are within parentheses. Significant at the *** 1 percent; ** 5 percent; * 10 percent level.

Table 14: Riskiness mortgage loan: regression results

	[1]	[2]
Current Loan-to-value (LTV)	1.023***	1.020***
	(0.234)	(0.247)
Current Payment-to-net income (PTI)	0.851***	0.804***
	(0.282)	(0.297)
Endowment mortgage		-0.007
		(0.133)
Other mortgage		-0.201
		(0.333)
Full amortization		-0.245
		(0.206)
Investment based mortgage		1.090***
		(0.216)
Adjustable rate mortgage (ARM)		0.432**
		(0.198)
Threshold Parameters		
μ_1 (no risk at all to hardly risky)	-0.387**	-0.548***
	(0.156)	(0.169)
μ_2 (hardly risky to somewhat (or very) risky)	1.082***	0.998***
	(0.160)	(0.172)
Pseudo R-squared	0.09	0.13

Notes: (N=459). The table reports the regression coefficients from an ordered probit model. The dependent variable is the perceived riskiness of the own mortgage loan which has a response scale: 0 'no risk at all', 1 'hardly risky' and 2 'somewhat (or very) risky'. The second column includes indicators for the type of mortgage and an indicator for having an ARM versus FRM. The indicator for having an interest-only mortgage is the omitted category. The investment based mortgage type is interacted with the financial characteristics of the mortgage (i.e. LTV ratio and PTI ratio). Both specifications include controls for the year of origination of the mortgage loan. Standard errors are within parentheses. Significant at the *** 1 percent; ** 5 percent; * 10 percent level.

Figure 1: Distribution of predicted mortgage risk on the basis of the features of the mortgage loan



The graph shows the histogram of the predicted mortgage risk. A normal density function is plotted in the graph.

Table 15: Predicted mortgage risk and debt literacy: regression results

	[1]	[2]	[3]	[4]	[5]
Debt literacy score	0.127**	0.078**	0.078**	0.067**	0.066**
	(0.032)	(0.031)	(0.032)	(0.031)	(0.030)
Socioeconomic controls	No	Yes	Yes	Yes	Yes
Most important sources of information					
Professional financial advisor			0.240**	0.258**	0.201**
			(0.059)	(0.059)	(0.058)
Lender			0.03	0.012	-0.009
			(0.058)	(0.058)	(0.056)
Family and friends			-0.108*	-0.101	-0.121*
			(0.065)	(0.064)	(0.062)
Published sources			-0.031	-0.038	-0.034
			(0.056)	(0.056)	(0.054)
Most important sources of information × debt literacy score					
Professional financial advisor			-0.107*	-0.113*	-0.100*
			(0.062)	(0.061)	(0.059)
Lender			0.008	0.015	-0.022
			(0.062)	(0.062)	(0.060)
Family and friends			-0.152**	-0.129*	-0.086
			(0.075)	(0.074)	(0.072)
Published sources			-0.027	-0.039	-0.029
			(0.062)	(0.061)	(0.059)
Risk-, time preferences and experience					
Low perceived mortgage risk				0.097**	0.071**
				(0.033)	(0.032)
Risk averse				0.003	0.003
				(0.019)	(0.018)
Low time-preference				-0.023	-0.011
				(0.025)	(0.024)
Times moved				0.103**	0.086**
				(0.030)	(0.029)
Income risk					0.233**
					(0.058)
Wealth risk					0.245**
					(0.068)
Constant	0.02	0.674**	0.626**	0.530**	0.239*
	(0.056)	(0.122)	(0.120)	(0.139)	(0.144)
Adjusted R-squared	0.03	0.22	0.25	0.28	0.33

Notes: (N=459). The dependent variable is the predicted mortgage risk. The debt literacy score measure is equal to the number of correct answered debt literacy questions. Socioeconomic controls include: gender of the person managing the household finances, marital status, number of children, age dummies, indicators for the education level, income quantiles and a dummy for retirement status. The variable "perceived risk" measures the perceived riskiness of the attributes of a mortgage contract and is derived from a factor analysis on the six different features of a mortgage loan.

Standard errors are within parentheses. Significant at the *** 1 percent; ** 5 percent; * 10 percent level.

Table 16: Predicted mortgage risk and basic financial literacy: regression results

	[1]	[2]	[3]	[4]	[5]
Basic literacy score	0.061	-0.005	-0.001	-0.016	-0.006
	(0.046)	(0.045)	(0.045)	(0.044)	(0.043)
Socioeconomic controls	No	Yes	Yes	Yes	Yes
Most important sources of information					
Professional financial advisor			0.203**	0.225**	0.162**
			(0.060)	(0.060)	(0.058)
Lender			0.002	-0.014	-0.036
			(0.059)	(0.059)	(0.056)
Family and friends			-0.117*	-0.105	-0.132**
			(0.065)	(0.065)	(0.062)
Published sources			0.008	-0.004	-0.005
			(0.057)	(0.057)	(0.054)
Most important sources of information × basic literacy score					
Professional financial advisor			-0.01	-0.002	-0.016
			(0.093)	(0.091)	(0.088)
Lender			0.107	0.109	0.114
			(0.094)	(0.094)	(0.090)
Family and friends			0.019	0.027	0.133
			(0.106)	(0.104)	(0.101)
Published sources			-0.096	-0.091	-0.102
			(0.092)	(0.090)	(0.086)
Risk-, time preferences and experience					
Low perceived mortgage risk				0.103**	0.080**
				(0.034)	(0.033)
Risk averse				0.01	0.01
				(0.019)	(0.018)
Low time-preference				-0.028	-0.011
				(0.025)	(0.024)
Times moved				0.104**	0.083**
				(0.031)	(0.030)
Income risk					0.254**
					(0.059)
Wealth risk					0.266**
					(0.069)
Constant	0.046	0.795**	0.750**	0.661**	0.307*
	(0.124)	(0.160)	(0.159)	(0.169)	(0.172)
Adjusted R-squared	0.02	0.21	0.23	0.26	0.33

Notes: (N=459). The dependent variable is the predicted mortgage risk. The basic literacy score measure is equal to the number of correct answered basic literacy questions. Socioeconomic controls include: gender of the person managing the household finances, marital status, number of children, age dummies, indicators for the education level, income quantiles and a dummy for retirement status. The variable "perceived risk" measures the perceived riskiness of the attributes of a mortgage contract and is derived from a factor analysis on the six different features of a mortgage loan.

Standard errors are within parentheses. Significant at the *** 1 percent; ** 5 percent; * 10 percent level.

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