The Self-Selection Effects of Retail Financial Products. The Case of Contractual Savings for Housing in Germany

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"Contractual Savings for Housing" (CSH) products are popular in Germany. CSH may seem redundant in developed financial markets in which households have access to banking products. Based on theoretical models, we interpret CSH as a means to separate customers by self-selection. Using than 140,000 observations from more than 9,300 households covering the period 1998-2012, we conduct a regression and find robust support that CSH contributes to separate households with different profiles. This means the choice of CSH produces valuable information when risk is relevant. Moreover, we find empirical evidence that CSH attracts risk-averse households with a low time preference.

INTRODUCTION

The theory of financial intermediation addresses the efficiency of financial arrangements under asymmetric information. On one hand, the theory explains the existence and institutional design of financial intermediaries. This stream of literature refers mostly to Diamond's pivotal contribution, which showed that the welfare effects of commercial banks result from delegated monitoring (Diamond, 1984). On the other hand, the research on financial intermediation addresses the design of specific financial contracts. In this field, researchers often examine the allocation effects of specific pay-off schemes under asymmetric information. In line with this stream of literature we investigate whether the specific type of financial product known as "Contractual Savings for Housing" (CSH) ("Bausparen") can be considered an instrument of "self-selection". CSH as it is offered by building societies in Germany combines a savings period with a credit period in one contract. If the household's savings meet a fixed fraction of the fixed nominal value, it can obtain the missing fraction as a loan from the building society. All interest rates are agreed upon in advance. The interest rates during both the savings and credit periods are lower than the respective rates of commercial banks. If this specific CSH design is attractive for households with a particular risk-profile, whereas other households find better solutions with different financial products, self-selection can result. Thus, we expect that households reveal their risk profile by choosing CSH instead of mortgages or savings accounts. We apply this consideration to an empirical analysis.

We contribute to the literature in different ways: Our overall contribution is to determine whether the results revealed by researchers in the field of financial intermediation hold true for a relatively complex retail financial product. By doing so we contribute to an explanation of why CSH still exists, as it is often considered redundant in modern financial markets. This contribution is particularly relevant as there is not much research on CSH, despite its importance in practice and its high market share in Germany. Moreover, the understanding of the specific structure of the banking system – in this case in Germany – is improved. We also contribute to the field of household finance by analyzing self-selection, which is typically investigated with regard to firms instead. Last but not least, our findings can be related to the management of financial institutions, that is, building societies must nowadays reconsider their business models due to the low interest rate environment. Therefore, they must understand their typical type of customer to better address product marketing to the specific needs and attributes of clients.

To investigate whether the contractual design of German CSH results in self-selection, we conduct an empirical analysis using data from the "Socio-Economic Panel" (SOEP). To create reasonable and meaningful hypotheses, we must introduce some information regarding the institutional background of CSH in Germany, which is presented in chapter 2.1. Chapter 2.2 provides a review of the relevant literature and develops the hypotheses. In chapter 3, data and methodology are introduced. We apply a logit panel regression with random effects to investigate the hypotheses. Chapter 4 presents the results of the regression. The paper finishes with a discussion and a conclusion.

THEORETICAL BACKGROUND AND HYPOTHESES

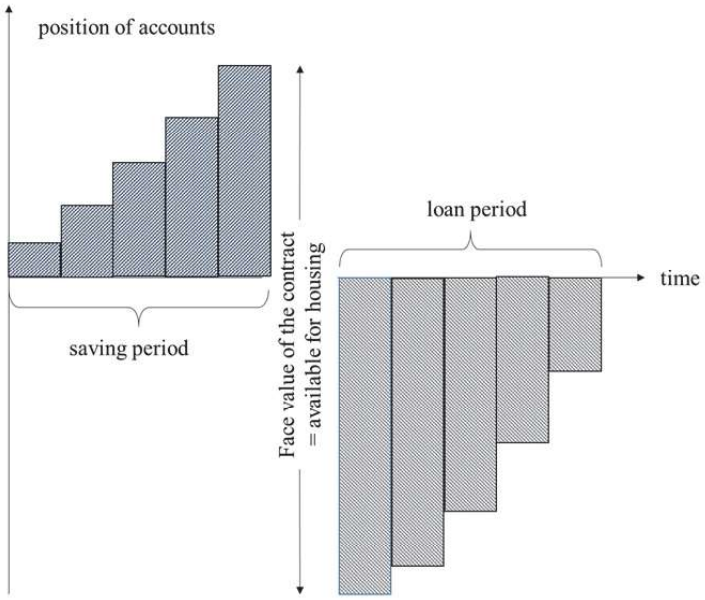
Background

Buying a home is typically the largest, most illiquid and longest-running investment of a private household (Campbell, 2006). Accordingly, home acquisition cannot be accomplished with free cash, and a private household must thus abstain from consumption to buy a home. To become a homeowner, spending must be reduced for savings in advance and/or to meet the post-purchase obligations of a mortgage. Because home ownership provides crucial benefits at the individual and societal levels, particular types of financial intermediaries have developed over the centuries to foster home purchases. In Germany, building societies ("Bausparkassen") are a particular type of financial intermediary whose sole product is CSH, which successively bundles a savings contract and a loan contract in one agreement over a period of time. German CSH contracts share their origin not only with all building societies in Europe but also with traditional Rotating Savings and Credit Associations (RoSCAs). In general, RoSCAs regularly collect small savings from private households to periodically grant relatively larger loans to some of these households. RoSCAs contribute to welfare when their members do not have access to banks (Besley, Coate, & Loury, 1993; Price, 1958). The RoSCA model explains the origin of building societies, which were invented as mutual institutions at a time when bank loans were not easily available to private households with smaller incomes. As financial markets have emerged, the RoSCA model appears to be redundant. Building societies in the United Kingdom developed into a type of mutual retail bank when the market for financial services opened to consumers (Barnes & Dodds, 1983). By contrast, German building societies continue to provide savings and loans for housing purposes in the traditional mode, and they are still not permitted to offer additional financial services.

The "savings for housing" contracts that are offered in Germany are structured into two time periods (see Figure 1). Initially, the savers make regular and agreed-upon payments into the account (the savings period). The account has a fixed face value (e.g., $100,000). If the sum of the savings and the aggregated interest meet a defined threshold (e.g., 40%) of the face value and some other requirements are fulfilled, the remaining amount can be accessed as a loan (60%) (the loan period) that is repaid in regular, fixed installments. The interest rates for the savings and the loan are fixed in advance. Normally, both rates are significantly lower than the interest rates for savings and mortgages at commercial banks. A loan from a building society must be invested in the purchase or renovation of a home (house or apartment). No other use is allowed, but there is no obligation to take the loan. If the saver does not request a loan, he/she can spend the money in the savings account for any purpose. Because the ability of the building society to

lend money is restricted to the savings of their customers, the closed structure involves the specific risk that German building societies cannot guarantee a fixed date on which the loan will become available (Scholten, 2000).

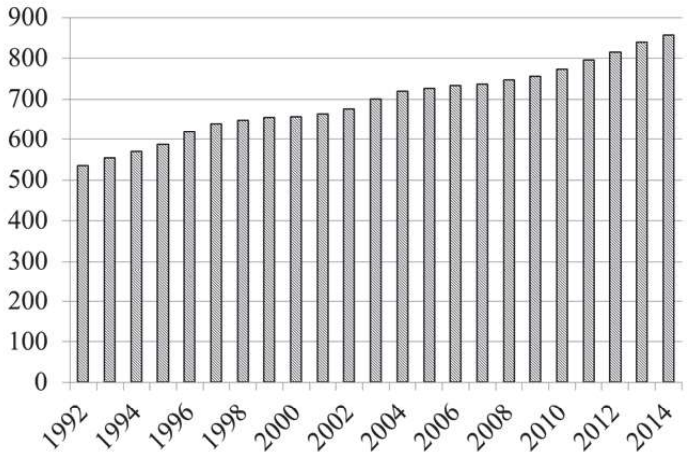
FIGURE 1
STYLIZED STRUCTURE OF GERMAN SAVINGS FOR HOUSING CONTRACTS



The limitation of the funding to contractual savings leads to an additional feature of these agreements. Because they are based on a collective of saving households, these agreements are separated from the interest rates in the capital market. A German building society can guarantee a fixed rate not only for the saving period but also for the loan period because the building society is not directly affected by changes in the yield curve in the market. However, because the customer is not committed to obtaining the loan, the contracts feature characteristics of interest rate options. However, this feature cannot explain why CSH still exists because there are other highly liquid tools (forward rate agreements) with low transaction costs available to address interest rate risks and that are less complex as they are not linked to savings.

Therefore, the question remains why the CSH financial product still exists and is even relatively successful, as Figure 2 exhibits (VPB, 2015).

FIGURE 2
NOMINAL VALUE OF GERMAN CSH CONTRACTS 1992-2014 (IN BILLIONS OF €)



One explanation of why CSH still exists in Germany highlights the policy of the German government to pay subsidies to those households that hold CSH contracts to encourage home ownership (Scholten, 2000). However, the potential windfall gains cannot explain the overall structure because many households that are ineligible for such subsidies still invest in CSH contracts (Börsch-Supan & Stahl, 1991).

Our study is focused on the economic question whether CSH contracts involve self-selection. From this perspective, in order to be explained economically, the contractual design must contribute to welfare. To obtain deeper insights, we examine the related literature more closely and extract hypotheses that are empirically testable.

Literature and Hypotheses

The concept of "self-selection" follows the consideration that decisions made by the borrower can contribute to overcoming information asymmetries between creditors and debtors. By choosing rationally among different types of contracts, the borrower reveals his/her quality in terms of creditworthiness. For example, the bank offers loans with different degrees of collateralization and different interest rates. A high-quality borrower will choose the contract with collateral and a low rate, whereas a poor-quality borrower will prefer a contract with no collateral and a higher rate (Bester, 1985). In this arrangement, when a borrower agrees to one particular financing contract instead of another, it provides valuable information to the lender. In most of the literature, self-selection is modeled with respect to financing the risky projects of entrepreneurs or firms. Thus, the problems of adverse selection and moral hazard are understood to result from hiding the real choice of projects ex ante or ex interim. Beside screening (e.g., Dell'Ariccia & Marquez, 2006; Hauswald & Marquez, 2003), signaling (e.g., Leland & Pyle, 1977; Milde & Riley, 1988), and building relationships (e.g., Petersen & Rajan, 1994), self-selection is one mechanism by which the design of financial contracts provides information.

However, consumer loans should be examined from a different angle. The ability to make all contractually agreed-upon payments to the bank – interest payments and repayments – normally does not depend on the economic outcomes of the goods that are financed. A private household does not invest, but may yet require additional consumption. Adverse selection and moral hazard result primarily from the (in)ability and (un)willingness of the household to reject excessive consumption. If we ascertain that there are financial contracts with peculiar payment designs, it should thus be important to examine more closely whether they contribute to self-selection. We note that different types of contracts are available in housing finance. In our perspective, potential homeowners can choose between CSH on the one hand and a mortgage or traditional savings contract, followed by a mortgage, on the other hand. As there are different

points in time when decisions must be made if a household holds a CSH-contract self-selection can occur at the beginning of the savings period (ex ante) as well as at the beginning of the loan period (ex post) (Burghof & Schairer 2017). As we are interested in investigating the overall profile of CSH we look at ex ante self-selection.

We find some academic studies that are more directly related to CSH products in Germany. Lea and Renaud (1995) investigated if the German (and French) model of building societies could help to develop a market for housing finance in the transition economies of Middle and Eastern Europe. In this context, the authors argue that CSH can be a helpful to select steady savers as future borrowers through its screening and monitoring function. Recently, Kirsch and Burghof (2016) delivered theoretical insights into the CSH products that are offered in Germany. These authors develop a multi-period partial equilibrium model of relationship lending. The model is based on information production in preceding saving relationships. An important assumption is that individuals' saving behavior is substantially driven by the same characteristic as their debt service behavior, which is the ability to abstain from consumption. Kirsch and Burghof find in their theoretical model that savings-linked relationship lending, however, is generally an equilibrium choice in markets with low time preference or in markets with low average borrower quality. In these markets, savings-linked relationship lending leads to increasing allocative efficiency of the financing market compared with arm's-length lending. As CSH is prototypically based on the concept of savings-linked lending, the model provides a theoretical relationship lending explanation for this particular financial product. Although their work is solely theoretical, Kirsch and Burghof's contribution to the field nevertheless seems seminal and concludes that empirical evidence is necessary. Different to our study Kirsch and Burghof focus on the point in time when the loan is taken. Therefore they can look backwards and take the savings period as experience period. The same ex post perspective is taken by the recent empirical study provided by Burghof and Schairer (2017). These authors compare the default rates of loans provided to CSH-customers who achieved the full savings period with the default rate of loans granted to such CSH-customers who were not able or not willing to do the agreed savings. The study reveals that the CSH-loans perform better even if one take the usual measures for creditworthiness into account.

Focusing at the point in time when the CSH-contract is agreed, we assume that these contracts, through self-selection, separate borrowers by quality (Lea & Renaud, 1995). Under capital market conditions that are not biased by quantitative easing, the interest rates of CSH in the saving period are lower than the rates of commercial banks for undedicated savings. The same is true in the loan period, i.e., households that agree on CSHs waive higher interest rates on their savings to pay lower interest rates on a loan. From this perspective, CSH contracts make sense only for households that are certain about obtaining the loan (Diaz-Serrano, 2005). In this context, self-selection means that a borrower with no collateral, i.e., savings, at the beginning but with the willingness and quality to buy a home can reveal his quality through CSH. Because this type of potential homeowner sees a high probability of qualifying for the loan and benefiting from the low interest rate in the loan period, he accepts the low rate on the savings.

In economic terms, households using CSH must be certain that they can attain the required regular savings, i.e., they must represent a relatively low income risk, which is reflected in a stable income, and they must be able to abstain from excessive consumption. This consideration mirrors that not only the level of household income but also its volatility is a substantial input factor for a bank's credit-scoring model (e.g., Jacobson & Roszbach, 2003). Households that desire their own homes but are unsure about regular savings are better off with the savings scheme of a commercial bank that yields higher earnings. From the financial institutions' perspective, this consideration leads to the conclusion that German CSH contracts are particularly attractive to households with a lower income risk, whereas households with higher income risk will put their savings in a commercial bank. However, we do not expect a simple linear relationship between income risk and the probability that a household pays on a CSH contract. According to the Kirsch and Burghof (2016) model, the information from CSH contracts is valuable, ceteris paribus, when average borrower quality is lower. Transferred to our research question, this finding also indicates that, for borrowers with very stable income and, vice versa, the lowest income risk, CSH

must be not attractive. Because these households can obtain a mortgage from a commercial bank early, without dedicated savings before buying a home, this sub-group of very-low-risk households omits itself from CSH. As a consequence, the possible remaining potential CSH users consist only of medium-income risk households because CSH is not particularly attractive to households of very low risk or to households of high risk. Therefore, with respect to the stability of household income, we expect self-selection through an inverse U-shaped relationship.

Income stability is only one driver of risk; the ability to abstain from excessive consumption is another factor. Abstinence from excessive consumption may be driven by external shocks, which we assume are likely to be equivalent for all households. Additionally, consumption is driven by the risk preference of the respective household. We assume that a household with a particularly high degree of risk aversion is keener to avoid high consumption. Moreover, from the customers' perspective, the risk structure of German CSH contracts differs from typical saving schemes and mortgages. On one hand, all interest rates are fixed in advance, which provides an interest cap on the loan. On the other hand, the building society is unable to guarantee the exact date on which the loan can be granted. If we consider an investor's perspective, these differences in the risk profile establish an opportunity for diversification (Scholten, 2000). According to our research question, this finding delivers a solid basis for the proposition that CSH contracts are particularly attractive to risk-averse households that benefit from diversification.

According to these considerations, we propose the following hypotheses.

Hypothesis 1: The risk and risk preference of a household are related to the use of CSH contracts.

H1a: When household income presents a medium level of risk, the probability that the household has a CSH contract is higher.

H1b: When the degree of risk aversion of a household is higher, the probability that the household has a CSH contract is higher.

Decisions on consumption, savings and borrowing are closely related to the time preference of a household. Patient households with a low degree of time preference accumulate savings before consumption, whereas impatient households are tempted to obtain a loan and save afterwards as they repay the bank. Consistent with the arguments of Kirsch and Burghof (2016), we expect that a typical CSH household exhibits a low degree of time preference. Families who want to become homeowners but have a high time preference will attempt to obtain a mortgage from a bank immediately. This consideration results in hypothesis 2.

Hypothesis 2: When a household's "time preference" is lower, the probability that the household has a CSH contract is higher.

Hypotheses 1 and 2 encompass the core issues of our study. To learn more about the manner in which German CSH contracts contribute to separating different types of households, we test two additional hypotheses.

The proportion of homeowners is lower in Germany than in other Western countries. The majority of people live in rented apartments, although home ownership is held in high regard (Diaz-Serrano, 2005). In investigating the relationship between rent and CSH, two opposing effects have to be considered. On the one hand a high monthly rent limits a household´s ability to save as well as to consume. This argument parallels our thoughts regarding hypothesis 2 on "time preference". Rent is not the only input factor influencing both potential consumption and potential savings and can be isolated to further investigate the matter. On a more behavioral level, one must consider that the expectation of becoming a homeowner remains promising, particularly for families who pay a high monthly rent. One can assume that

households accustomed to paying a high monthly amount for housing would be rather in favor of taking a loan in the future. We expect that this behavioral effect dominates and propose hypothesis 3:

Hypothesis 3: When a household's rent is higher, the probability that the household has a CSH contract is higher.

A household's decision to buy a home depends on the financial ability to fulfill its obligations. In this context, it seems mandatory to have a minimum household income level that exceeds the household income for the bare necessities of life (Diaz-Serrano, 2005). This restriction should hold true also for households that use CSH. Moreover, taking income into account allows us to disentangle income risk and income level.

Hypothesis 4: When a household's income is higher, the probability that the household has a CSH contract is higher.

We include several control variables in our analysis: Because Rottke and Klos (2013) showed that children have a significant effect on household savings and consumption, we control for the influence of children on CSH. Before the reunification in 1990 two completely different societal systems determined a household's life circumstances in Germany. Therefore, we control for the regional distribution of CSH contracts. Further, we control for the effect of the development of home prices on CSH products. Finally, CSH contracts provide a low risk profile for the saving household. Therefore, a CSH contract will be valuable in times of instability, particularly when investor sentiments change. We control for the (exogenous) capital market sentiment in different ways. First, a CSH contract allows long-term interest rates to be fixed not only for savings but also for the future loan. This type of option should be attractive when interest rates are highly volatile in capital markets. Second, if CSH is not susceptible to market risk, it may contribute, in particular, to the overall portfolio risk of a household when interest rates and other returns are volatile. Third, although not directly linked to the volatility of the financial markets but rather to their state, the crucial differentiation between CSH contracts and the combination of an undedicated savings account and a normal mortgage is determined by differences in interest rates. This spread is more salient when interest rates are high.

DATA AND METHODS

Data

To test the hypotheses, we use data from the SOEP from 1998-2012 (SOEP 2014). In total, the dataset consists of 193,247 observations from an average of 12,883 households per year.

The SOEP is a wide-ranging representative longitudinal study of private households in Germany in which the same private households, persons and families have been surveyed annually since 1984. In 1990, the SOEP expanded to include the states of the former German Democratic Republic (GDR). Since then, new sub-samples were added to include special sub-populations and to stabilize the sample size. The data provide information on objective living conditions, values, willingness to take risk, current social changes and the relations and interdependencies among all these areas. The data input is obtained through face-to-face interviews (Haisken-DeNew & Frick, 2005). The response rate is relatively high and ranges between 60 and 70% (Haisken-DeNew & Frick, 2005). The respondents are individuals who live in Germany, and they are polled on household and personal issues. Because of the annual addition of several nationwide sub-samples (e.g., households from eastern Germany and immigrants), the SOEP can be considered a nationally representative longitudinal dataset. In general, the survey attempts to evaluate all the intergenerational aspects of the applicable living environment and interviews not only the "head of household", as in other longitudinal datasets, but also each adult household member (Haisken-DeNew & Frick, 2005; Wagner, Frick, & Schupp, 2007). The dataset contains unique quantitative and qualitative microeconomic information because of this setting. Therefore, the SOEP is ideal for use in financial research, such as research on household finance. Using SOEP data solves the challenge of obtaining high-

quality, long-term panel data to perform positive studies on household finance (Campbell, 2006). According to our research question, the SOEP provides the necessary information for our dependent variable, CSH, in particular. Moreover, the SOEP data enable the tracking of a long contractual saving period for a household that may finance an investment in housing and relates to other household-specific criteria, such as income, consumption and ownership status. However, because some of our independent variables do not span the full range of the SOEP data, we limit our study to a period of fifteen years.

Because the intention to become a homeowner must be understood as a decision of the family rather than that of an individual, we apply the data on the household level. On this level, the survey includes CSH as a dichotomous variable. CSH is annually surveyed as a fixed part of the SOEP dataset. Every household is asked whether it pays on a CSH contract (1 = yes, 0 = no). The data reveal that, over the years, approximately 40% of the households answered "yes" (the treatment group) and 60% answered "no" (the control group). This rate is consistent with other statistics in the market for CSH contracts in Germany (VPB, 2015).

To make our model more robust and valid, we incorporate macroeconomic information from secondary sources to test all our hypotheses and to control for additional variables. We consider the inflation rate as published by the German census bureau ("Statistisches Bundesamt") to properly evaluate the households' real income changes. To assess investor sentiment in the underlying years, we use the current average yield on outstanding German bonds that is provided by the German Central Bank (Deutsche Bundesbank) to measure the interest rate level and volatility. Additionally, the average monthly volatility of the German leading share index ("DAX 30") is calculated annually. We obtain these data from Thomson Reuters. The German House Price Index, which is used in our analysis, is provided by the Organisation for Economic Co-operation and Development (OECD).

After eliminating incomplete information for several variables, our final sample consists of 140,766 observations with an average of over 9,384 households per year.

Table 1 presents definitions and characteristics of the variables featured in our estimation model.

TABLE 1
LIST OF VARIABLES AND CHARACTERISTICS

Variable	Definition
$\ln(Chg.Income_{it})$	Logarithm of the absolute value of a change in household net income: $\ln(Chg.Income_{it}) = \ln(\lvert Realincome_{it} - Income_{it-1} \rvert)$ with $Realincome_{it} = \frac{Income_{it}}{1+i_{it}}$ and i_{it} equal to annual inflation rate in Germany
$\ln(Chg.Income_{it})^2$	$ln(Chg.Income_{it}) \times ln(Chg.Income_{it})$
$Timepref_{it}$	Time preference: $Timepref_{it} = \frac{AS_{it}}{Available\ Income_{it}}$ with AS_{it} equal to monthly amount (€) of savings, and $Available\ Income_{it} = Income_{it} - Debt\ Service_{it} - Rent_{it}$
$Rent_{it}$	Amount (€) of rent per month
$\ln(Income_{it})$	Logarithm of the absolute value of household net income
$Children_{it}$	Number of children
HPI_{it}	Nominal house prices index based on 100 percentage points in 2010
$Chg.IR_{it}$	Change in interest rates: $Chg.IR_{it} = IRL_{it} - IRL_{it-1}$
$DAXvola_{it}$	Calculated average DAX volatility on a monthly basis (per year)
IRL_{it}	Level of interest rates: Average of monthly current yields on outstanding German government bonds (per year)
CSH_{it}	Contractual Savings for Housing: 0 = no; 1 = yes
$LifeIns_{it}$	Life insurance: 0 = no; 1 = yes
$State_{it}$	Federal state in Germany: 0 = West Germany; 1 = East Germany

With respect to H1a, *ln(Chg.Income)* measures the income risk of the household as the yearly change in net income. Following the discussion in Campbell (2006) of the long timespan that determines household finance, we adjusted the change in income by the annual inflation rate because we assume that the households' decisions between savings and consumption are based on purchasing power, which must

be comparable over time. Taking the natural logarithm of the change in household income generally provides a more symmetric and realistic view of the relationship that we seek to investigate. To test the non-linear H1a, we need *ln(Chg.Income)*^{2}, which takes just the change in income to the power of two.

To investigate H1b, we need a proxy for a household's risk aversion. The SOEP includes an item that should reveal the respondents' risk preference, but this item is unfortunately not regularly part of the survey. Because of this limitation, we used life insurance as a proxy for risk aversion. In Germany, all households are free in their decision to insure their life risk, as it is generally not offered by an employer as a benefit in an employment contract. Moreover, life insurance is not regularly required in Germany when taking a loan. Whether a household possesses life insurance is captured by the dummy variable *LifeIns*. The time preference of a household is strongly related to net savings. If the time preference is relatively low, regular savings are relatively high, and payments for consumer loans should be zero in the ideal case. Following this argumentation, the theoretical extreme cases would be a household with the lowest time preference that saves its whole income for total consumption in the future and vice versa. Because not only time preference but also external shocks affect consumption, this relation will not strictly hold. Thus, we use net savings as a proxy for time preference. *Timepref* is thus calculated as the difference in the amount (€) of monthly savings divided by the amount (€) of available (monthly) income. Available income is the amount (€) of monthly income less the amount (€) paid for loans every month and the rent.

The total amount (€) of monthly rent (*Rent*) and the natural logarithm of household net income (*ln(income)*) is taken directly from the SOEP.

We also include household-specific and macroeconomic control variables, such as the influence of children (*Children*) on CSH, which is measured by their number. Moreover, the geographic region of the household (*State*) is expressed as a dummy variable, which equals 1 for East Germany (incl. Berlin) and 0 otherwise. Another control variable is the nominal house price development (*HPI*), which is based on 100 percentage points in 2010 and fluctuates around this number throughout the years. Moreover, as an exogenous control variable, we control for the financial market sentiment, and we test the annual change in the average interest rate (*Chg.IR*). To include the volatility of non-interest rate returns, we apply the volatility of the leading share index, the "DAX 30" (*DAXvola*), as the average monthly volatility (%) of the respective year. Both variables are measured in percentage points. We also test the average annual interest rate level in percent (*IRL*) based on the average current yield of outstanding German government bonds.

The descriptive statistics of our variables are presented in Table 2.

TABLE 2
DESCRIPTIVE STATISTICS

Household observations (n = 140,766)				
	Mean	Standard Deviation	Min	Max
CSH (1=yes)	0.406	0.491	0	1
ln(Chg.Income)	5.426	1.629	-4.604	12.134
ln(Chg.Income)^2	32.099	17.006	0	147.232
LifeIns (1=yes)	0.512	0.500	0	1
Timepref	0.102	0.163	-12.5	25

Rent	273.618	345.641	0	8248
ln(Income)	7.774	0.628	2.303	12.206
Children	0.603	0.956	0	12
State (1=East Germany)	0.285	0.451	0	1
HPI	100.110	4.465	95.296	112.2
Chg.IR	-0.002	0.006	-0.001	0.051
DAXvola	0.055	0.020	0.013	0.079
IRL	0.040	0.008	0.025	0.054
CSH (1=yes)	0.406	0.491	0	1
LifeIns (1=yes)	0.512	0.500	0	1
State (1=East Germany)	0.285	0.451	0	1

Methods

Because the independent variable is dichotomous and because we want to provide an estimate and quantification of the average marginal effects (AME) on CSH, we implement a logit random effects regression model for our multivariate analysis. Using random effects estimators is appropriate because we attempt to explain the differences among households rather than the variation in a specific household over time. It is more important to understand the differences between the households that rely on CSH and those that reject CSH. We further argue that, technically, fixed effects do not work properly with the variables that do not actually change over time (e.g., *CSH*, *LifeIns*, *Children*, *State*). Fixed effects also produce larger standard errors as random effects, which include information not only within but also among households (Allison, 2009; Wooldridge, 2010; Wooldridge, 2014). Therefore, our regression model can be formulated as follows:

$$CSH_{it} = \beta_0 + \beta_1 \ln(Chg.Income_{it}) + \beta_2 \ln(Chg.Income_{it})^2 + \beta_3 LifeIns_{it} + \beta_4 Timepref_{it} + \beta_5 Rent_{it} + \beta_6 \ln(Income_{it}) + \beta_7 X_{it} + \varepsilon_{it} \quad (1)$$

The variables in the regression model are as follows:

- i is a unique household identifier, and t is the survey year;
- CSH and $LifeIns$ are dummy variables;
- $\ln(Chg.Income)$, $\ln(Chg.Income)^2$, $Timepref$, $Rent$ and $\ln(Income)$ are metric scaled variables;
- X is a vector of control variables; and
- ε is the error term.

We calculate our model in a hierarchical way to show the contribution of our hypothesis variables in contrast to our control variables. As an additional robustness test, we compare our results with the results

of an OLS regression. We acknowledge that the coefficients cannot be interpreted precisely, but their direction supports the significance of our variables (e.g., Hanna & Lindamood, 1985). See Appendix 1 for the results. To show our model fit, we offer a Pseudo-R^2, Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) in our main regression, as well as a Mc-Faddens-R^2 in our OLS regression.

Concerning H1a, we must address a non-linear, inverse U-shaped relation. We expect CSH to attract those households with a medium income risk, in particular. Households with a stable income and households with a high risk are not disposed to CSH. To technically address the non-linearity of our expectation in a linear estimation model, we include, in addition to the basic variable *ln(Chg.Income)*, the same variable as a squared $ln(Chg.Income)^2$. Both variables must be tested for statistical significance to test H1a. This type of empirical modeling is common in economic and management research that questions the non-linear U-shaped relations of the independent variables over time (Cortina, 1993; Katila, 2002; Lind & Mehlum, 2010; Pannenberg, 2010). Next, we investigate whether the estimated maximum/minimum of the function is located in the general observation range (e.g., Aghion, Bloom, Blundell, Griffith, & Howitt, 2005; Imbs & Wacziarg, 2003; Sigman, 2002). We conducted both tests and show the results below.

We also tested for multicollinearity by conducting a correlation analysis. Overall, we have no evidence of multicollinearity.

TABLE 3
CORRELATION MATRIX

	CSH	*ln(Chg. Income*	*ln (Chg. Income*	*LifeIns*	*Timepref*	*Rent*	*ln (Income)*	*Children*	*State*	*HPI*	*Chg.IR*	*DAXvola*	*IRL*
CSH	1												
ln(Chg.Inc	0.097	1											
ln(Chg.Inc	0.088	0.977	1										
LifeIns	0.343	0.158	0.153	1									
Timepref	0.058	0.035	0.038	0.064	1								
Rent	-0.147	0.008	0.005	-0.050	-0.018	1							
ln(Income)	0.256	0.326	0.324	0.357	0.176	0.030	1						
Children	0.157	0.158	0.149	0.192	-0.107	0.024	0.277	1					
State	-0.043	-0.080	-0.083	-0.011	0.013	0.009	-0.154	-0.055	1				
HPI	-0.018	0.040	0.039	-0.031	0.017	0.084	0.124	-0.018	0.008	1			
Chg.IR	-0.000	-0.030	-0.040	0.004	0.002	0.062	0.098	0.005	-0.002	0.022	1		
DAXvola	-0.004	0.094	0.104	0.010	0.011	0.060	0.086	0.005	0.005	0.262	-0.029	1	
IRL	0.008	0.184	0.202	0.059	0.005	0.135	0.167	0.051	0.004	-0.240	0.391	0.171	1

Using random effects instead of fixed effects as an estimator can lead to an endogeneity issue (Allison, 2009). In accordance with Schlueter, Sievers, and Hartmann-Wendels (2015), who worked with a dataset from a building society and dealt convincingly with the endogeneity issue, we applied adequate instrument variables to identify and solve this potential issue (see Appendix 2.A and 2.B) as a further robustness check. We found at least one instrument variable for each of our (exogenous) independent variables that has a low correlation with our dependent variable CSH. Afterwards, we ran a 2SLS regression to obtain a predicted estimator for our independent variables and to clarify a random error term for our main model. Our results show that, in each of the single 2SLS regressions, the single independent variables stay robust.

RESULTS

The regression results are presented in Table 4. In addition, the average marginal effects (AME) are calculated to feature a more intuitive interpretation of the coefficients. The AME show the average change of probability of CSH if, ceteris paribus, the independent variable changes by a marginal unit (Powers & Xie, 2008). However, in this setting, the AME should not be used to compare the variables with one another. We cannot evaluate which marginal effects have the highest impact on CSH because some marginal effects are measured in different units.

TABLE 4
REGRESSION RESULTS

	Random Effects Model A			**Random Effects Model B**		
	Coeff.	**SE**	**AME**	**Coeff.**	**SE**	**AME**
Hypothesis Variables						
ln(Chg.Income)	0.278 ***	0.020	0.056			
ln(Chg.Income)^2	-0.028 ***	0.002	-0.006			
LifeIns	1.195 ***	0.013	0.240			
Timepref	0.369 ***	0.044	0.074			
Rent	-0.001 ***	0.000	-0.000			
ln(Income)	0.597 ***	0.013	0.120			
Control Variables						
Children	0.160 ***	0.007	0.032	0.335 ***	0.006	0.078
State	-0.064 ***	0.013	-0.013	-0.156 ***	0.012	-0.037
HPI	-0.012 ***	0.003	-0.002	-0.007 ***	0.002	-0.002
Chg.IR	-0.999	2.397	-0.201	0.297	1.246	0.069

DAXvola	-0.310	0.747	-0.062	-0.091	0.363	-0.021
IRL	-5.103 ***	1.893	-1.025	-0.601	0.952	-0.141
Constant	-4.821 ***	0.372		0.154	0.179	
AIC	165,629			196,270		
BIC	165,767			196,349		
Sigma_u	0.048			0.016		
Rho	0.001			0.000		
Wald Chi-square	20,356			3,744		
Pseudo-R^2	0.210			0,033		
Number of Obs.	140,766			148,546		

***, ** and * indicate statistical significance at the 0.01, 0.05 and 0.10 levels, respectively.
Pseudo-R^2 are computed with McKelvey & Zavoina's Pseudo-R^2 approach.

These results confirm our main hypothesis H1a. We find not only statistical significance but also economic impact, which is measured by the marginal effects. Illustration 3 exhibits this gradient based on the more intuitive average marginal effects. The maximum of this natural logarithmic function based on AME is located at 5.0, which reflects an annual change in the amount (€) of monthly income of approximately 148 €.

The coefficients of $\ln(Chg.Income_{it})$ and $\ln(Chg.Income_{it})^2$ exhibit an inverse U-shape. Therefore, we find empirical evidence that CSH contracts are particularly attractive to households with medium income risk.

Our proxy for risk aversion is also significantly and positively related to the probability of CSH (H1b). We conclude that CSH is also particularly attractive to those households that attempt to carry a low risk. Because we assume that very-low-risk households can take mortgages from commercial banks without a previous systematic savings scheme, we interpret this finding as a separation between medium- and high-risk households. Thus, our findings confirm self-selection. Indirectly, our findings are consistent with the theoretical considerations of Kirsch and Burghof (2016).

The data also reveal evidence at the 0.01 level of a significant link between a household's time preference and the probability that the household pays on a CSH contract. In line with H2, we find that, when the time preference is lower, the probability of having a CSH contract is higher. This finding reflects the feature of CSH contracts that a savings period must pass before a loan can be requested. A relatively low time preference indirectly contributes to bank risk because households with a low time preference will not be tempted to consume excessively. Incidentally, our findings affirm the results from the Kirsch and Burghof (2016) model. All in all, the empirical findings support the core issues of the theoretical considerations.

We do not find empirical evidence supporting H3. We expected that CSH contracts would be particularly attractive to households that pay high rent for living accommodations. We find a significant relationship between CSH and rent but in the opposite direction. CSH contracts seem to be less attractive to households that pay a high monthly rent. We conclude that high rent works as a restriction on monthly CSH payments. Households with a high monthly rent are not able to put money aside for both the savings

and loan periods of CSH. However, this finding should not be over-estimated as the marginal effect is extremely low.

Furthermore, ln(*Income*) is also statistically significant at the 0.01 level. This confirms that a higher monthly income increases the probability that a household has a CSH contract. The room for interpreting this finding is limited. In Germany, as in all other countries, homeownership is not equally distributed according to income. Therefore, the result might be driven by the fact that households with CSH include only potential homeowners, whereas all households without usage of CSH also include households that will never qualify as homeowners. Therefore, we cannot find evidence for self-selection in terms of income. However, the results help us to obtain a deeper understanding of two considerations. First, acquiring a home requires a minimum income to make payments to the lending institution. Unsurprisingly, this also seems true for CSH users. Second, the positive and significant linkage between income and CSH usage can be seen as a control with respect to hypothesis 1a. The respective findings result only from changes in income and not from the level of income. Therefore, evidence of a positive relationship between income and CSH allows for disentangling both aspects.

With respect to the control variables, it seems find that the decision regarding CSH is weaker linked to conditions in the capital markets as only the level of interest rates is significant. As number of children, region and level of house prices are significant we conclude that households decide to become homeowners separately from other financial considerations. We assume that mental accounting occurs.

The strong increase of our Pseudo-R^2 by including our hypothesis variables in our hierarchic regression model supports our model calibration.

DISCUSSION

We investigate whether the design of financial retail products that are embodied in German CSH contracts can be explained by considerations that are provided by the theory of financial intermediation. We find that CSH attracts medium-risk households with a low time preference in particular. Therefore, CSH provides self-selection. Self-selection is mostly investigated in the context of corporate finance due to a lack of data at the individual and household level. Our analysis shows that it can also be found in household finance if we investigate different institutional arrangements for housing finance. The provision of self-selection explains to some extent why traditional building societies still exist in some countries. Thus, our study helps to better understand the institutional structure of the (German) financial system, particularly from a customer perspective. We find some evidence that CSH is not a relic of former times but contributes to the acquisition of information. Of course, one should not overvalue our findings as we cannot rule out that subsidies or hard-selling of CSH-contracts are additional reasons why the product is still popular. But our results show that the particular profile of CSH provide some endogenous economic benefits by delivering information.

Furthermore, our result also contributes to the literature if we put it in the more general context of housing finance. Given that most of the households in Germany that use CSH are not able to buy a home through the building society alone, additional financing from a commercial bank is required. If CSH accounts for the separation of borrowers of lower and higher risk, this information is particularly valuable to the commercial bank underwriting the second type of loan (i.e., less secured or more expensive). From this perspective, self-selection at the beginning of the savings period can result in a possibility for signaling at the end of the respective period. We cannot provide empirical evidence supporting this interpretation with our dataset, but we find some anecdotal evidence. For example, in a special promotion in 2014, “DSL Bank”, an indirect subsidiary of the largest German bank, “Deutsche Bank”, offered a borrowing rate subsidy of 0.2% on an existing loan contract if the customer signed a CSH contract and used the future savings to service the loan after the savings period (DSL Bank, 2014). In cooperation with their building-society subsidiaries, public retail banks (“Sparkassen”) also offer comparable product combinations in which a standard loan serves as the initial home financing and must subsequently be repaid via a CSH contract (Sparkasse, 2015).

Moreover, we contribute to the emerging field of household finance. Given our results, potential homeowners must make decisions regarding the best way to finance their house. It appears that income risk, risk preference, and time preference are important factors in these decisions. We did not employ any psychological variables in our analysis; nevertheless, the decisions seem to be quite rational in terms of the informational level of selecting the appropriate financing instrument. On average they behave rationally.

The study also has several practical implications. Building societies and CSH are particularly affected by the very low interest rates in the Eurozone. We find that the difference in interest rates compared to market in both the savings period and the loan period is the key factor in information provision by CSH. If building societies become more economically stressed, they might be tempted to change their business model to commercial banking. This may be reasonable from an entrepreneurial perspective but places a crucial feature of their business model at risk.

The limits of our analysis are established by the restrictions in the available data. We concede that some of the variables used are only proxies. For example, it would be preferable to more directly measure risk aversion and the ability to abstain from consumption. We accept these restrictions because the SOEP provides us with a unique set of information at the individual household level over a long time range, which helps overcome the typical data problem detected by Campbell (2006) for the field of household finance.

Further research is required to obtain a deeper understanding of how the information produced by CSH is processed in the overall setting of home financing. We can provide only anecdotal evidence that those households that use CSH are considered low-risk customers by the commercial banks that grant the additional loan to buy or build a home.

As we find that CSH is not just a relic from times when the market for retail financial products was less developed, it may be interesting to examine why CSH exists in Germany and some other European countries, whereas it disappeared in other countries such as the UK decades ago. To answer this question the way in which information is produced in markets for financial retail products must be comprehensively investigated across countries.

ENDNOTES

1. We will focus on the economically important features of saving for housing contracts and not provide all the extraneous details.

REFERENCES

Aghion, P., Bloom, N., Blundell, R., Griffith, R. & Howitt, P. (2005). Competition and innovation: An inverted-U relationship. *Quarterly Journal of Economics*, 120, 701-728.

Allison, P. D. (2009). *Fixed effects regression models*. Thousand Oaks, CA: SAGE Publications.

Barnes, P. & Dodds, C. (1983). The structure and performance of the UK building society industry 1970-78. *Journal of Business Finance & Accounting*, 10, 37-56.

Besley, T., Coate, St. & Loury, G. (1993). The economics of rotating savings and credit associations. *American Economic Review*, 83, 792-810.

Bester, H. (1985). Screening vs. rationing in credit markets with imperfect information. *American Economic Review*, 75, 850-855.

Börsch-Supan, A. & Stahl, K. (1991). Do savings programs dedicated to home-ownership increase personal savings? *Journal of Public Economics*, 44, 265-297.

Burghof, H.-P. & Schairer, M. (2017). *Loan Performance of Contracual Savings for Housing* (Working Paper). Rochester, NY: SSRN.

Campbell, J. Y. (2006). Household finance. *Journal of Finance*, 61, 1553-1604.

Cortina, J. M. (1993). Interaction, nonlinearity, and multicollinearity: Implications for multiple regression. *Journal of Management*, 19, 915-922.

Dell'ariccia, G. & Marquez, R. (2006). Lending booms and lending standards. *Journal of Finance*, 61, 2511-2546.

Diamond, D. W. (1984). Financial intermediation and delegated monitoring. *Review of Economic Studies*, 51, 393-414.

Diaz-Serrano, L. (2005). Labor income uncertainty, skewness and homeownership: A panel data study for Germany and Spain. *Journal of Urban Economics*, 58, 156–176.

DSL Bank. (2014). Sonderaktion – Sollzinssubventionierung in Verbindung mit BHW-Bausparverträgen [Special promotion – Borrowing rate subsidy in connection with signing a BHW-CSH-contract]. Retrieved September 1, 2015, from http://www.intercapital.de/PDF/DSLBank.Sonderaktion.pdf

Haisken-DeNew, J. P. & Frick, J. R. (2005). *DTC desktop companion to the German Socio-Economic Panel (SOEP)* (8 ed.). Berlin, Germany: DIW.

Hanna, S. D. & Lindamood, S. (1985). Ownership and ownership preference: A comparison of OLS and logit regressions. *Housing and Society*, 12, 133-146.

Hauswald, R. & Marquez, R. (2003). Information technology and financial services competition: Table. *Review of Financial Studies*, 16, 921-948.

Imbs, J. & Wacziarg, R. (2003). Stages of diversification. *American Economic Review*, 93, 63-86.

Jacobson, T. & Roszbach, K. (2003). Bank lending policy, credit scoring and value-at-risk. *Journal of Banking & Finance*, 27, 615-633.

Katila, R. (2002). New product search over time: Past ideas in their prime? *Academy of Management Journal*, 45, 995-1010.

Kirsch, S. & Burghof, H. P. (2016). *Information production from individual saving behavior and relationship lending* (Working Paper). Rochester, NY: SSRN.

Lea, M. J. & Renaud, B. (1995). *Contractual savings for housing: How suitable are they for transitional economies* (Policy Research Working Paper 1516). Washington, DC: World Bank.

Leland, H. E. & Pyle, D. H. (1977). Informational asymmetries, financial structure, and financial intermediation. *Journal of Finance*, 32, 371-387.

Lind, J. T. & Mehlum, H. V. (2010). With or without U? The appropriate test for a U-shaped relationship. *Oxford Bulletin of Economics and Statistics*, 72, 109-118.

Milde, H. & Riley, J. G. (1988). Signaling in credit markets. *Quarterly Journal of Economics*, 103, 101-129.

Pannenberg, M. (2010). Risk attitudes and reservation wages of unemployed workers: Evidence from panel data. *Economics Letters*, 106, 223-226. doi:10.1016/j.econlet.2009.12.005

Petersen, M. A. & Rajan, R. G. (1994). The benefits of lending relationships: Evidence from small business data. *Journal of Finance*, 49, 3-37.

Powers, D. A. & Xie, Y. (2008). *Statistical methods for categorical data analysis* (2nd ed.). Bingley, UK: Emerald Group Publishing.

Price, S. J. (1958). *Building societies. Their origins and history*. London, UK: Franey & Co.

Rottke, S. & Klos, A. (2013). *Saving and consumption when children move out* (SOEP Paper No. 621). Berlin, Germany: DIW.

Schlueter, T. Sievers, S., & Hartmann-Wendels, T. (2015). Bank funding stability, pricing strategies and the guidance of depositors. *Journal of Banking & Finance*, 51, 43-61.

Scholten, U. (2000). Rotating savings and credit associations in developed countries: The German-Austrian Bausparkassen. *Journal of Comparative Economics*, 28, 340-363.

Sigman, H. (2002). International spillovers and water quality in Rivers: Do countries free ride? *American Economic Review*, 92, 1152-1159.

Sparkasse. (2015). Vorfinanzierung – Bauen ohne Bausparvertrag mit einer Vorfinanzierung [Initial financing – Building a house without a CSH-contract]. Retrieved September 1, 2015, from www.sparkasse.de/privatkunden/baufinanzierung/vorfinanzierung.html

VPB. (2015). Bausparen – The system. Retrieved September 1, 2015, from www.bausparkassen.de/index.php?id=93

Wagner, G. G., Frick, J. R. & Schupp, J. (2007). *The German Socio-Economic Panel study (SOEP) – Scope, evolution and enhancements* (SOEP Paper No. 1). Berlin, Germany: DIW.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data* (2nd ed.). Cambridge, MA: MIT Press.

Wooldridge, J. M. (2014). *Introduction to econometrics*. Andover, UK: Cengage Learning.

APPENDIX

Appendix 1: OLS Robustness Check

	Random Effects GLS A			Random Effects GLS B		
	Coeff.		**SE**	**Coeff.**		**SE**
Hypothesis Variables						
ln(Chg.Income)	0.044	***	0.003			
ln(Chg.Income²)	-0.004	***	0.000			
LifeIns	0.264	***	0.003			
Timepref	0.064	***	0.008			
Rent	-0.000	***	0.000			
ln(Income)	0.117	***	0.002	0.199	***	0.002
Control Variables						
Children	0.035	***	0.001	0.045	***	0.001
State	-0.014	***	0.003	0.001		0.003
HPI	-0.002	***	0.000	-0.007	***	0.000
Chg.IR	-0.190		0.228	-0.264		0.267
DAXvola	-0.059		0.065	-0.070		0.078
IRL	-1.012	***	0.181	-3.047	***	0.206
Constant	-0.452	***	0.035	-0.383	***	0.040
Sigma_u	0.001			0.003		
Rho	0.000			0.000		
Wald Chi-square	27,611			12,216		
McFadden R^2	0.164			0.079		
Number of Obs.	140,766			140,835		

***, ** and * indicate statistical significance at the 0.01, 0.05 and 0.10 levels, respectively.

Appendix 2.A: Applicability of the instrument variable approach

Dependent variable	Instrument variable	Explanation	Applicability of instrument variables
ln(Chg.Income)/ ln(Chg.Income)²	*Operating Assets (OAssets)*	Household income earned through operating assets (e.g., self-employed): 0 = no; 1 = yes	Highly correlated with x_i: Status of employment mainly determines the household income. Households with a higher income volatility should be self-employed or entrepreneurs.
			Weak correlation with u_i: Operating Assets have no impact on CSH because CSH is a private decision and owning operating assets explains only how monthly income is generated.
	Pressure (Risk)	Self-defined pressure because of debt service: 0 = nonapplicable; 1 = low; 2 = medium; 3 = high	Highly correlated with x_i: Pressure of debt service affects mostly households with no income certainty (e.g., self-employed). Therefore, households face a higher pressure when the income volatility is higher.
			Weak correlation with u_i: Self-defined pressure because of debt service has no impact on CSH because, first of all, CSH is a saving decision with no obligation to take a loan after the saving period.
Lifeins	*Pressure (Risk)*	Self-defined pressure because of debt service: 0 = nonapplicable; 1 = low; 2 = medium; 3 = high	Highly correlated with x_i: Pressure of debt service is also a proxy for a subjective risk measure for the risk preference of a household that wants to reduce its life-risks through additional (life) insurance. A higher pressure indicates more risk sensitivity, which can be insured with financial products.
			Weak correlation with u_i: Again, self-defined pressure because of debt service has no impact on CSH because CSH is a saving decision with no obligation to take a loan after the saving period.
timepref	*Savings Account (SA)*	Savings account: 0 = no; 1 = yes	Highly correlated with x_i: A savings account indicates the willingness to abstain from consumption and therefore is a further proxy for our measure of time preference, which includes more information.
			Weak correlation with u_i: A household that has a CSH contract with a defined or unlimited savings scheme does not need an additional savings account.
Rent	*house_type (H_type)*	Housing and units per building: 1 = Farm House; 2 =	Highly correlated with x_i: The housing environment and the area where a household lives determine the monthly

		1-2 Fam. House; 3 = 1-2 Fam. Rowhouse; 4 = Apt. in 3-4 Unit Bldg.; 5 = Apt. in 5-8 Unit Bldg.; 6 = Apt. in 9+ Unit Bldg.; 7 = High Rise	rent. As a proxy, as the amount of residential units in a building increases, the probability that the area is urban and that the rents are higher on average increases.
			Weak correlation with u_i: The CSH decision is not connected to the housing environment or whether it is an urban or a rural area.
ln(Income)	*Operating Assets (OAssets)*	Household income earned through operating assets (e.g., self-employed): 0 = no; 1 = yes	Highly correlated with x_i: Status of employment mainly determines the household income. Households with a higher total income should be self-employed or an employer.
			Weak correlation with u_i: Operating assets have no impact on CSH because CSH is a private decision and owning operating assets explains only how monthly income is generated.

Appendix 2.B: 2SLS IV regression for an independent variable (1st stage) and for the corrected main regression on CSH (2nd stage)

	2SLS IV control for *ln(Chg.Income) / ln(Chg.Income²)*			2SLS IV control for *LifeIns*		2SLS IV control for *Timepref*		2SLS IV control for *Rent*		2SLS IV control for *ln(Income)*	
Independent Variables	1st stage (A)	1st stage (B)	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage	1st stage	2nd stage
ln(Chg.Income)			**1.284*** **								
			(0.220)								
ln(Chg.Income²)			**-0.107*** **								
			(0.020)								
LifeIns					**0.731*** **						
					(0.097)						
Timepref							**4.058*** **				
							(0.137)				
Rent									**-0.000*** **		
									(0.000)		
ln(Income)											**0.175*** **
											(0.026)
Control Variables											
Children	0.252***	2.374***	0.001	0.098***	-0.001	-0.017***	0.151***	5.948**	0.082***	0.168***	0.048***
	(0.009)	(0.091)	(0.011)	(0.004)	(0.011)	(0.001)	(0.005)	(2.638)	(0.003)	(0.004)	(0.006)
State	0.161***	1.710***	0.052***	0.035***	0.049***	0.006***	0.047***	-14.866***	0.071***	0.097***	0.059***
	(0.020)	(0.0204)	(0.010)	(0.008)	(0.009)	(0.002)	(0.011)	(5.560)	(0.007)	(0.009)	(0.008)
HPI	-0.012***	-0.063***	0.007***	-0.006***	0.003***	0.001***	-0.005***	9.685***	0.001***	0.024***	-0.006***
	(0.002)	(0.017)	(0.002)	(0.000)	(0.001)	(0.000)	(0.001)	(0.204)	(0.000)	(0.000)	(0.001)
Chg.IR	15.883***	91.730***	-10.537***	1.224***	-0.892**	-0.113	1.005	-202.216	0.007	2.263***	-0.316
	(1.602)	(15.853)	(1.826)	(0.388)	(0.429)	(0.150)	(0.636)	(133.864)	(0.182)	(0.204)	(0.193)
DAXvola	2.457***	22.899***	-0.617***	0.186**	-0.068	0.053**	-0.253**	-89.514***	-0.026	0.305***	-0.056
	(0.322)	(3.275)	(-0.164)	(0.077)	(0.084)	(0.026)	(0.113)	(21.251)	(0.039)	(0.042)	(0.041)
IRL	-19.765***	-102.494***	14.319***	-2.012***	1.479***	0.210**	-1.843***	6736.838***	1.785***	13.934***	-2.613***
	(1.825)	(17.723)	(2.457)	(0.419)	(0.490)	(0.103)	(0.474)	(175.903)	(0.285)	(0.263)	(0.426)

Instrumental Variables											
OAssets	1.005***	11.360***								0.500***	
	(0.035)	(0.431)								(0.017)	
Risk	0.036***	0.217***		0.034***							
	(0.008)	(0.078)		(0.003)							
SA						0.057***					
						(0.002)					
H_type								49.024***			
								(0.885)			
Constant	6.717***	35.664***	-4.269***	1.066***	-0.269**	-0.011	0.461***	-976.392	0.233***		-0.299**
	(0.220)	(2.205)	(0.785)	(0.059)	(0.121)	(0.021)	(0.091)	(24.989)	(0.043)		(0.125)
F-test of excl. instruments	412.15***	352.03***	59.93***	107.98***	94.83***	1273.35***	214.94***	3068.63***	138.44***	917.54***	119.01***
Under-identification test			128.617***		107.122***		1105.287***		1967.361***		488.531***
Observations	80.669	80.669	80.669	82.963	82.963	143.917	143.917	148.546	148.546	140.835	140.835

This table presents estimates of the regressions with instrumental variables to investigate the effect of the single independent variables on CSH. Each model reports the results for the specific independent variables and for the main model. In the first stage, we calculate the specific independent variables with our instrumental variables. In the second stage, we replace each original specific independent variables from our main model with its predicted value from the first stage and estimate the effect of the specific independent variable on the dependent variable CSH. Test statistics are calculated via STATA command ivreg2. Standard errors are reported in parentheses. The symbols ***, ** and * indicate statistical significance at the 0.01, 0.05 and 0.10 levels, respectively.