Do Homeowners Save more than Renters? – Evidence from the German Wealth Survey

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Abstract

In this paper we analyze the impact of property ownership on the saving behavior of households. We are particularly interested in investigating whether homeowners save more than renters or not. A related question is whether mortgage payments and other regular financial savings are substitutes or complements for German households. To answer these questions we use two waves of a large dataset on individual households' finances and employ a difference-in-difference matching estimator. We find that households owning property and repaying mortgages save more than renters, if mortgage payments are included in active saving flows. Apart from mortgage payments, the difference in savings flows of renters and owners with a mortgage is small and insignificant. Owners with a mortgage do not seem to substitute any savings in financial assets with mortgage payments but use the repayments to save on top. Including owners without a mortgage into the analysis, we find evidence that repaying a mortgage induces some "learning", in the sense that owners without a mortgage have savings levels in between comparable owners with a mortgage and renters. The differential savings behavior documented in our paper can have implications for the reaction of aggregate consumption and saving e.g. if different types of households are hit differently by macro-economic shocks.

Keywords: household saving, homeownership, survey data

JEL-Classification: D14, R21, D31, D91

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1. Introduction

Different homeownership rates have been identified as one of the main explanatory factors for differences observed in median net wealth of households across Euro Area countries. Recent evidence based on household surveys with detailed wealth information has not only confirmed that homeownership rates vary considerably across countries, but also that homeowners are on average and in the median considerably richer than renters in all countries (HFCN (2013), Christelis et al. (2013)). In Germany, for example, the mean net wealth of owners is about eight times higher than the mean net wealth of renters. Why is this the case? And how are homeowners - before and after buying a house - different from renters in Germany? In principle, buying a home is simply an exchange of financial assets (and debts) for real assets. If this line of reasoning is correct, there is no a priori reason why owning a home is a good predictor for high wealth, as renters should just hold their wealth in investments other than property. The evidence from wealth surveys shows, however, that the value of financial assets is also higher for owners than renters: mean financial wealth is twice as large for mortgaged households than for renters and more than three times as large for outright owners than for renters. Why differences between homeowners and renters exist, can have many reasons, e.g. differences in the distribution of inheritances/gifts, income differentials, different asset price developments of real versus financial assets, different propensities to buy property and different levels of savings of homeowners versus renters.

In this paper we investigate the saving behavior of renters and owners. Our main research question is whether renters (all other things equal) save less and consume more than comparable owners (with a mortgage and outright owners), which would explain their low wealth. There are good reasons to assume that this is indeed the case. Usually buying a home is linked to transaction costs as well as considerable debt burden and repayment obligations vis-à-vis a financial institution. The repayment obligations require owner households with a mortgage to save a fixed amount each month, whereas renters do not accumulate wealth by paying rent. In theory, the rent should only be as high as the interest payments of the owner plus some compensation for depreciation, for the same level of housing services. In this situation renters should (everything else equal) have income left for consumption or savings that is not spent on mortgage repayments. In other words, differences in the wealth of renters and owners can only manifest if renters consume a (large) fraction of their income that they would otherwise have to spend on mortgage payments had they bought a house. A second research question concerns the link between mortgage payments and other (regular) savings flows. If owner households reduce their savings in financial assets because they have to repay

mortgages, the effect on net wealth would be smaller than if the mortgage repayments are complementary to other savings. If full substitution took place, owner households would only become relatively richer if house prices outperformed the returns on other investments.

We use the new Bundesbank survey on household finances in Germany ("Panel on Household Finances" – PHF) to analyze these questions. This survey presents an excellent data source to analyze both the saving behavior of German households and the differences between rent payments and repayments on mortgage loans. In particular, the dataset includes active saving flows of households' regular and discretionary savings into a variety of investment vehicles and detailed information on mortgage payments as well as rental payments. To answer our research questions we use matching techniques to match renter and mortgaged owner households as well as renters with outright owners with similar characteristics. With two waves of the PHF study we are able to control for unobserved heterogeneity by using a diff-in-diff matching approach.

We find that homeowners with a mortgage save substantially more than renters when we compare otherwise equal households. This difference can mainly be attributed to the fact that mortgaged homeowners exhibit flows for savings flows into financial assets comparable to those of renters, and in addition they save on top by repaying their mortgages. We also find evidence that outright owners who have paid down their mortgage save more than renters. The differential saving behavior has aggregate consequences which we will briefly touch upon below.

Our contribution to the literature is twofold: First, our data set allows us to analyze in detail the savings portfolio of the three groups of households that we consider: renters, mortgaged households and outright owners. We describe in detail the flow of savings of each household into financial and real assets, thereby complementing existing research that uses differences in wealth stocks over time as savings indicator. Second, the panel matching estimator that we use enables us to control for unobserved heterogeneity among renters' and owners' behavior.

The rest of the paper is organized as follows: section 2 reviews the literature and outlines the analytical framework for our study. In section 3 we present a description of the dataset and variables, before we move on to explain our empirical strategy, i.e. the matching procedure, in section 4. We outline the results of our empirical analysis in section 5, before we conclude in section 6.

2. Literature Review and Analytical Framework

There is ample evidence that homeownership is correlated with higher levels of wealth accumulation than renting (see e.g. Di et al. (2007), Dietz and Haurin (2003)), and various reasons have been put forward in the literature why homeowners are richer than renters. Classical arguments include house price developments, different returns from housing versus financial assets or differential savings behavior of owners and renters.

Campbell and Cocco (2007) find that rising house prices in the UK have large positive effects on (older) homeowners' consumption while there is no effect on (young) renter households which they attribute to a wealth effect of homeownership. On the other hand, a large literature has argued that simultaneous increases in house prices and consumption may be driven by common factors contradicting the wealth channel from house price growth to consumption (see Attanasio and Weber (1994), Attanasio et al. (2009) and Attanasio et al. (2011)). For the US, Engelhardt (1996) finds an asymmetry in the saving behavior of households with total and unanticipated real housing capital gains. Households experiencing a real gain in housing do not reduce their saving while households with real housing capital losses increased their saving in response to a real house price appreciation.

While house price increases in other countries in the Euro Area might be one main determinant of the high net wealth of households in these countries with respect to German households (see HFCN 2013, Christelis et al 2013), the German housing market has displayed virtually stagnating prices until 2010. The German housing market, with its large and well-functioning rental market, has traditionally been characterized as a market without notable price increases until 2010. A reversal of this trend is only notable after the Great Recession (see Deutsche Bundesbank, 2013).

Apart from offering a service stream, buying a house is also an investment in a risky asset, and naturally the expectation of the house price development will also determine the decision to buy a home. A large literature has used simulated returns from owning a house relative to renting under various model assumptions about financing, mortgage plans and alternative investments, which renters could have undertaken with their down payment (see, for example, Goodman (1997), Goetzman and Spiegel (2002) and Belsky et al (2007)). When comparing the user cost of capital of home owners to the cost of renting, most of these studies find that for the U.S. home returns are higher than inflation but below financial market returns.

Important determinants are the holding period that is analyzed as well as the quality of the house and the location of the building.

A related question is whether homeowners have different portfolio profiles than renters and how their asset portfolio interacts with their housing stock. Flavin and Yamashita (2002) estimate the risk and return to financial assets and real estate and calculate optimal portfolios of homeowners. They show that young households which are typically highly leveraged and have high housing to net worth ratios prefer to reduce the risk of their portfolio by either paying down mortgage or by holding bonds instead of stocks while older households have a higher optimal portfolio share of stocks as their housing to net worth ratio is lower. Hurst (1998) finds that better balanced portfolios of homeowners lead to higher levels of wealth than portfolios that only hinge on homeownership. Several other papers have studied the optimal evolution of housing and non-housing consumption over the life cycle (Yang (2009), Cocco (2004), Yao and Zhang (2004)).

Another channel, the one we focus on in this paper, towards the higher wealth accumulation may be that home owners have a higher propensity to save than renters, both before and after buying their main residence. Recent literature suggests that owners use mortgage repayments as a commitment device to save (Kovacs and Moran 2017, Schlafmann 2016). Kovacs and Moran (2017) show that households become owners not only because they expect higher future returns on housing but because they want to reap the "commitment benefit" of housing. In other words, repaying mortgages helps households to commit to self-imposed savings plans even if other assets have higher returns. Therefore, an interesting group to study is renters planing to purchase a house in the future and whose ability to make a down payment may be affected by a house price increase. They can respond to house price increases either by an increase in savings or by a reduction if they decide to postpone buying a house. Gross (2017) builds a heterogeneous agent model with liquid and illiquid assets. One of his model's implications is that households save more in anticipation of buying property, because they will be credit constrained once they took out a mortgage. Testing the model's implications with data from the PSID, he shows that renter households who are planning to buy have negative marginal propensities to consume. Sheiner (1995) finds that renters living in high house price areas accumulate significantly more net worth than those living in less expensive areas. She concludes that young people are indeed liquidity constrained as they save more in order to be able to make a higher down payment.

Once renters become owners, making mortgage payments is a form of forced savings, and hence owners may save more than renters after achieving homeownership simply because mortgage repayments discipline them to do so. Di et al. (2007) use the PSID to examine how actual tenure choices made by households have affected wealth accumulation over long periods. They find that homeownership itself is strongly correlated with greater future net wealth rather than the propensity to save prior to acquiring a home. Using the same data set, Skinner (1989, 1994) finds mixed evidence of owning a house on saving rates by home owners. Krumm and Kelly (1989) argue that overall savings do not seem to differ between renters and owners but that owners substantially increase their non-housing savings beyond that of renters. For Germany, Grunert (2003) documents that the average savings rate of homeowners is more than double the average savings rate of renters. She attributes the higher savings rate to the forced savings due to mortgage redemption and to a habituation effect after the full mortgage repayment. In contrast to these findings, Kaas et al (2017) describe that homeownership decreases households' financial wealth and other real net wealth at least if households have inherited their houses.

Our study differs from previous empirical work as we use matching techniques to compare homeowners with a mortgage and renters as well as outright owners and renters by employing two waves of the German wealth survey which comprises savings flows and wealth levels at a very detailed level.

Analytical framework

Our analytical framework is based on a classic budget constraint of households:

$\text{Consumption}_t + \text{Savings}_t = \text{Income}_t + (1+r)\ \text{Assets}_{t-1}$

With the detailed data on savings flows and mortgage repayments we are able to measure different components of the budget constraint and differentiate owner and renter households:

Owners face the following budget constraint:

$\text{Housing Consumption}_t\ (\text{interest}_t + \text{depreciation}_t)$[1] $+ \text{Non-durable Consumption}_t + \textit{Mortgage Repayments}_t + \textit{Other Loan Repayments}_t + \textit{Savings}_t = \text{Income}_t + (1+r)\ \text{Assets}_{t-1}$

While the budget constraint for renter households is:

$\text{Housing Consumption}_t\ (\text{rent}_t) + \text{Non-durable Consumption}_t + \textit{Other Loan Repayments}_t + \textit{Savings}_t = \text{Income}_t + (1+r)\ \text{Assets}_{t-1}$

From this decomposition of the different components in the budget constraint of the two household types, it is already clear that owners with a mortgage will save more than renters, if the mortgage repayments do not substitute for other savings and if owners with a mortgage and renters have similar non-mortgage savings. To assert whether this is the case we will empirically test the following hypotheses:

H1: Households which own their main residence and repay a mortgage are saving more than renter households, if saving is defined as the sum of financial savings and mortgage repayments.

H2: Households owning their main residence and repaying a mortgage do not fully substitute non-mortgage savings for mortgage repayments.

Besides these two hypotheses, we also want to look at the savings behavior of households that have paid off their mortgage. We will thus also look at renters and owners without a mortgage as well as owners with and without a mortgage. This analysis is more explorative in nature. There are several reasons why outright owners might save more than renters. On the one

[1] We define "Housing Consumption" as the current expenditure on housing and do not consider income or consumption streams for owned dwelling, e.g. by including imputed rents in this concept.

hand, one could expect that homeowners without a mortgage save more than comparable renters, because they have "learned" or "gotten used" to saving, from the time they started to save for the down-payment until they have paid of their loan. On the other hand, outright owners tend to be older, retired and smaller households. According to the life-cycle model, households smooth consumption over the life cycle and deal with the drop in income by dissaving after retirement while keeping their consumption stable. Hence, one could also expect outright owners to dis-save in comparison to younger renters or mortgaged owners. A recent literature on the retirement-savings puzzle, however, documents that individuals reduce their debt and increase their savings around retirement (see Olafsson and Pagel (2017) and the literature therein). Nakajima and Telyukova (2015) find that retired homeowners dis-save slowly because they prefer to stay in their house as long as possible but cannot easily borrow against it. Our expectations are summarized in the two hypotheses below.

H3: Households which own their main residence and have repaid their mortgage are saving more than renter households.

H4: Households which own their main residence and have repaid their mortgage save less than homeowners still repaying a mortgage.

The German context

For the interpretation of the results it is important to keep the context in which the analysis is undertaken in mind, i.e. the institutional settings in Germany.

The German housing market is characterized by a low homeownership rate in international comparison. In 2010 and 2014 the share of households owning their main residence was 44.2%, compared with 60% and 61% respectively in the euro area. The rental market is well-developed and households are able to find rental housing in almost all locations and qualities. House prices have been stable until 2010 (HFCN 2013, Christelis et al 2013) and have been growing since then, particularly in larger cities. For buying a house most households take out a mortgage with a local bank. Most banks allow households to take out loans with a loan-to-value ratio of around 75%. Put differently, households are expected to contribute about 25% out of their savings to the purchase. In addition to the down-payment households will also have to pay taxes and other transaction costs (brokerage fees, notary expenses) that typically amount to 6-10% of the value of the house. Chiuri and Jappelli (2003) show, that these costs are high in comparison to other countries. For our analysis this is very relevant, because

households have an incentive to start saving for an intended home purchase already when they think about buying property and not only once they have taken out the mortgage.

Once a household has taken out the mortgage, typically banks will require some repayment each month. Interest only loans have not been very common in Germany. Another important feature of the German system is that the mortgages are predominantly fixed-rate mortgages with interest rate fixation periods between 10 and 20 years. Typically the household and the bank fix an annuity payment, which includes interest and repayment for the interest rate fixation period, i.e. even when the mortgage is almost paid off the household would still pay the same annuity amount.[2] With this type of repayment owners with a mortgage will automatically save more with the passing of each repayment period. Finally it is noteworthy that mortgage tax payments are not tax deductible and thus have no bearing on after tax income. A very different environment is the one of the Netherlands which Kovacs and Moran (2017) use to analyze wealthy hand-to-mouth households. Households usually are not forced to make regular repayments on their mortgages but mostly pay only the interest rate on their mortgage. As a result, wealth accumulation of owners is far slower than in Germany

Besides the institutions concerning the home purchase process, it is important to note the German savings culture. Germans typically organize their saving in (long-term) contracts, even for classic savings accounts. This makes it very easy to collect savings (flow) data, because households know what they regularly pay on these contracts. Beyond this measurement issue, a lot of these longer term contracts (e.g. whole-life insurance contracts and private pensions) have penalty payments if the contract is dissolved pre-maturely, potentially leading to a more stable savings behavior than observed in other countries. The market for these contracts is large and both insurance companies and banks are active in it.

Taking everything together, we think that the German context is particularly interesting for our analysis, as it provides several incentives to save for (prospective) homeowners and offers alternative illiquid savings vehicles for renters. Furthermore the institutional features make the German market a good example to analyze differences between owners and renters as there is a good alternative for owning a house.

[2] To further illustrate this point let us consider the following simplified example. The household takes out a loan of 100 euro. The interest rate is 4% and 1% is repaid each period. The annuity is 5%(4%+1%). In period 1 the household pays an annuity of 5 euro, i.e. 4 euro interest and 1 euro interest. In period two, the loan is only 99 euro, so the 5 euro annuity is composed of 3.96 euro (99*4%) interest and 1.04 repayment

3. Data, Key Variables and Descriptive Statistics

In this section we describe the dataset, the key variables of our empirical analysis and provide some descriptive statistics.

The PHF survey

We use data from the "Panel of Household Finances" (PHF), a household survey on wealth in Germany. The PHF was conducted in 2010/2011 and 2014[3]. It is part of a larger effort to collect harmonized wealth data in the Euro Area, the so called "Household Finance and Consumption Survey" (HFCS). In contrast to most other studies in the Euro Area, the PHF has a special focus on savings. It collects for all asset types, not only the value of the asset but also the amount invested in the asset on a regular basis. The questions on regular savings are supplemented with questions on discretionary savings and savings motives in the PHF. The survey also collects detailed information on homeownership and mortgages. The unit of observation for the survey is the household. Most information is therefore available on the level of the household, with the exception of income and pension questions which were collected for individual household members older than 16 years, but can be aggregated to the household level. The random sample is representative for households German. It was designed to oversample households living in wealthy areas. In total 3 565 households participated in the 2010 survey, while 4 461 households participated in 2014, about half of the 2014 sample are panel households.

Key variables

At the core of our analysis is the saving behavior of households in Germany. The PHF was designed to collect qualitative and quantitative data on regular savings attached to financial assets. It also collects information on all private pensions and has a summary question on discretionary savings. Furthermore, interest payments and repayments are collected for every secured and unsecured loan. This comprehensive coverage of savings allows us to differentiate between gross and net savings. Gross savings is the sum of all investments in assets (savings and repayments) by households; to arrive at the net savings we subtract all savings that have been dissolved in a given year as well as new consumer loans taken out. The following table shows the items included in the savings measures:

[3] See Von Kalckreuth et al. (2012) and www.bundesbank.de/phf-research for details on the methodology.

Table 1 Components of gross and net savings

Regular saving flows into current and savings accounts
+ regular savings flows into mutual funds and other securities
+ regular savings flows into private and occupational pensions
+ repayments of mortgage loans for main residence
+ repayments of mortgage loans for other properties
+ repayments of consumer loans
+ irregular savings flows (discretionary savings)
= Gross savings
- savings stocks dissolved over the last 12 months
- initial loan value of new consumer loans taken out within last 12 months
= Net savings

We further differentiate within each of the two broad categories (gross and net savings), by calculating savings levels, including all loan repayments (excluding mortgages on secondary property), only mortgage repayments for mortgages secured with the household main residence and no loan repayments at all[4].

A key ingredient of our analysis is the identification of homeowners (with and without a mortgage) and renters in our sample. This is straight forward as the PHF contains direct questions on the homeownership status and on whether the household is servicing a mortgage loan. We put a household in the "homeowner with mortgage" group if the household owns its main residence at least partially and has an outstanding mortgage attached to this property.

To control for outliers we drop the top and bottom 1% of households for each savings indicator used in the empirical analysis described below. This means e.g. that households with annual net savings flows of less than -78,000 euro or more than 83,000 euro are excluded.

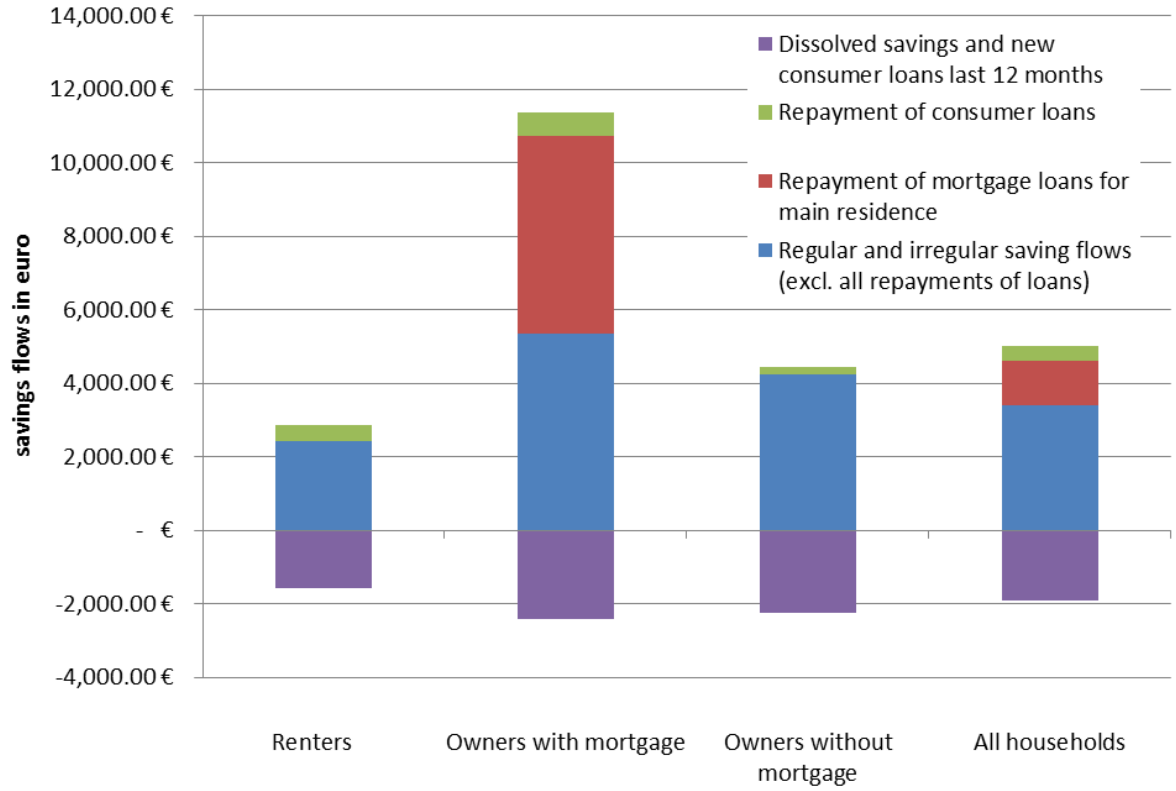
Descriptive Statistics

The concept we are most interested in is the savings behavior of owners and renters. The weighted descriptive statistics for the 2014 wave show that homeowners do on average save more than renters. Obviously this would be the case if mortgage repayments were included in

[4] Please note that we analyze differences in the actual savings amounts and not the savings rate in our matching procedure below. Our propensity score estimation includes the net household income as a regressor. As a result, we will compare households with the same or a very similar net income after the matching is done.

the savings concept, but the difference between the two groups remains if one focuses on all regular savings – excluding mortgage repayments - only (see Figure 1 below).

Figure 1 Annual savings flows for German households by type of homeownership (excl. mortgage repayments), weighted, in euro for 2014



Source: PHF 2014, weighted.

The savings shares are also different across the groups. While renters save (net) on average 6.3% of their net income, owners with a mortgage save 20.9% and owners without a mortgage 8.8%. Taking all households together the savings share is 11.3%. At the "macro-level" all renters together contributed 27% to overall savings flows in 2014, while owners with a mortgage contributed 48% and owners without a mortgage almost 25%.

The PHF data confirms other studies, in that it shows substantial differences in both mean and median net wealth between owners and renters. One may argue that this is only an effect of including real estate in the net wealth concept. But the differences remain for financial wealth (Table 3), indicating that owners are wealthier on average than renters.[5]

[5] Further differentiating households by the age cohort of the main income earner shows, that substantial difference in wealth between owners and renters can be observed for all age cohorts. Results are available upon request.

Table 2 Net wealth holdings of German households by type of homeownership, weighted, in euro, implicate 1

Net wealth in euro	PHF 2010		PHF 2014	
	Mean	Median	Mean	Median
Renters	53,500	11,300	54,700	10,500
Owners with mortgage	283,200	167,200	336,900	155,500
Owners without mortgage	464,200	257,100	477,800	270,000
Total	202,353	53,400	218,900	64,000

Source: PHF 2010/1, 2014 – Implicate 1 – weighted.

Table 3 Financial wealth holdings of households by type of homeownership, weighted, in euro, implicate 1

Financial wealth in euro	PHF 2010		PHF 2014	
	Mean	Median	Mean	Median
Renters	31,600	8,300	34,500	7,000
Owners with mortgage	64,500	36,500	67,800	33,500
Owners without mortgage	90,000	44,000	104,900	45,500
Total	52,900	19,200	59,700	18,300

Source: PHF 2010/11, PHF 2014 – Implicate 1 - weighted

The comparisons presented above do not take into account, however, that owners and renters do not only differ in terms of their housing situation, but along several other dimensions as well. Therefore, the observed difference in savings levels cannot be attributed to the ownership status alone. The three groups – renters, mortgaged owners and outright owners - differ significantly with respect to several standard socio-demographics and other characteristics in the expected manner (see table 4 below). Homeowners (with mortgages) are on average larger, have higher income and are more likely to be married couples than renters. They are also less likely to be unemployed and show higher education levels. The PHF allows us to measure risk aversion and patience of respondents; both indicators can influence the decision to take up a mortgage. We see only small differences with respect to these indicators between owners and renters, however. Owners are slightly more patient and owners with a

mortgage are slightly less risk averse than renters. Outright owners tend to be older than the other two groups and to own more than one property.

Table 4 Characteristics of Owners and Renter in 2014

	Gross hh income (annual)	Net hh income (annual)	Age of main income earner	Household Size	Married Couple
	Mean	Mean	Mean	Mean	Share
renters	36,254	23,047	49	1.84	45%
home owners with mortgage	76,029	45,776	49	2.72	75%
home owners w/o mortgage	56,047	32,946	63	1.98	78%
Total	48,364	29,575	53	2.02	59%

	Main income earner unemployed	Main inc. earner: Medium Education (ISCED 3-4)	Main inc. earner: High education (ISCED 5-6)	Willingness to take risk	Patience
	Share	Share	Share	Score (0-10)	Score (0-10)
renters	5%	59%	25%	3.75	4.49
home owners with mortgage	1%	55%	40%	4.11	4.75
home owners w/o mortgage	1%	58%	37%	3.43	4.73
Total	3%	58%	31%	3.72	4.60

	Inheritance or gift received in past	Owns other property	Moved within last three years	Household in East Germany	Household lives in city centre
	Share	Share	Share	Share	Share
renters	21%	10%	20%	25%	57%
home owners with mortgage	35%	27%	6%	16%	29%
home owners w/o mortgage	41%	36%	1%	17%	34%
Total	29%	20%	12%	21%	46%

Source: PHF 2014 – Implicate 1 - weighted.

Interestingly the share of households having received a substantial gift or inheritance anytime in the past is higher among owners. These types of transfers may have alleviated credit constraints. Finally, we look at the location of the household main residence. We find that owner households are less mobile and more likely to be found in West-Germany outside of the city-center of bigger cities. All these factors will be taken into account in our empirical approach, when comparing the savings behavior of owners and renters.

4. Empirical Strategy – The Matching Procedure

We would like to assess the impact of homeownership alone on a household's savings behavior. Ideally, we would have an experimental setting in which households are randomly assigned to homeownership. In this setting, it would be possible to simply compare renters' and owners' savings behavior and get the causal effect of ownership on savings behavior. Obviously, homeownership is not randomly assigned, but based on households' decisions. As the descriptive analysis above has shown, homeowners and renters differ along several dimensions, like income or household size. Put differently, renters with certain characteristics are more likely to become homeowners than others and it is therefore not possible to directly compare the savings behavior of renters and owners. To address these issues, we take recourse to methods from the policy evaluation literature. In particular, we will combine a difference-in-difference approach with a matching estimation technique. This allows us to control for the different characteristics of the two groups.[6]

The basic idea of the matching methods is to re-establish the conditions of an experiment where a number of households are randomly assigned to a "treatment" group or a control group of similar households which do not receive the "treatment" (Dehejia and Wahba (2002)). If no experimental data is available it is difficult to answer the question, how a household would have behaved if it had not received the treatment ("counterfactual situation"). Simply comparing statistics of the treated and control group, leads to biased results, because the two groups vary along several dimensions other than the treatment status. It is therefore essential to make sure that similar households are included in the comparison. The matching procedure does just that, it is an algorithm to match each treated household to an untreated "twin" household, which shows the same characteristics except the treatment status. By comparing the outcome for the treated households in the hypothetical state (counterfactual) with the actual outcome, the impact of the treatment on savings ("average treatment effect on the treated (ATT)") can be isolated from other influences while keeping the heterogeneity of the households intact. An advantage of the matching over conventional regression type analysis is also that it does not require any assumption about the functional form of the link between treatment and outcome.

[6] The matching approach has its roots in labour market research (Heckman et al. (1998); Heckman et al. (1999); Lechner (1998, 1999, 2002)), but has been applied in many other fields as well.

The matching method in our case works as follows:

First, we start by splitting households into three groups, those owning the main residence and repaying a mortgage, outright owners and households renting their main residence. Note, our theoretical framework implies that owner households with repayment obligations exhibit a different savings behavior than renter households. Instead of matching homeowners and renters we will therefore match only homeowners with a mortgage to renter households, in the baseline setup.

In the classic matching procedure the second step is to assign each homeowner household with a mortgage one similar "twin" household from the renter households. In order to determine which households are similar, we use the propensity score instead of using the household characteristics we want to equate separately. The use of the propensity score helps us to avoid the so-called "curse of dimensionality", i.e. the more household characteristics we include in determining the twin, the harder it will be to find a good/exact match. Rosenbaum and Rubin (1983, 1985) argue that it is valid to reduce the number of matching dimensions to a single index: the propensity score, which is the probability to own property. In practice, the propensity score is a prediction estimated from a probit model regressing a "homeownership with mortgage" dummy on the characteristics of households. The idea behind matching on the propensity score is that renter households with the same probability to buy (propensity) as a homeowner with a mortgage are in all important dimensions like the homeowner, with the exception of their decision not to buy (yet).

In this paper we want to make sure that we compare owners with renters that are similar in terms of household demographics, characteristics of the main income earner, risk and patience of households, their mobility and the location of the dwelling they live in. We therefore include the following variables in the propensity score estimation: household demographics include the household-size (head count), the logarithm of household's net income and indicator variables of whether the household contains a married couple and whether it has received a substantial gift or inheritance in the past. The main income earner's characteristics are the age, her level of education, whether or not she is unemployed and measures of risk aversion and patience. To account for regional factors and in view of the heterogeneous house price developments in Germany we include the degree of urbanization (city centre vs. suburb and rural areas) of the municipality the household lives in and the location of the household in East or West Germany. Mobility is represented by a dummy variable indicating that the

household has lived in the dwelling he is currently in for several years as opposed to moving in the year of the interview. The estimated propensity score indicates the probability for each household (renters and owners) to be a homeowner with a mortgage.

To improve the quality of the matches we reduce the sample to households with "common support", i.e. we eliminate households that have a propensity score higher than the maximum or smaller than the minimum in the potential control group (Czarnitzki et al. (2007))[7]. We do not use sampling weights to obtain the propensity score. As Fröhlich (2007) argues, weights can be neglected in the estimation of the propensity score if the same sampling methods is used for the source and the target sample, i.e. both the treated and control group are from the same survey, which is the case here.

In order for the matching procedure to yield valid results, the conditional independence assumption (CIA) as described by Rubin (1977)) has to hold. It states that conditional on the propensity score treatment participation (e.g. owning the main residence and holding a mortgage) is statistically independent from treatment outcome (savings behavior). This CIA helps to overcome the problem that the owner household cannot be observed as a renter household as well, i.e. the counterfactual outcome is unobservable. If the CIA is fulfilled, we can obtain the average outcome of owner households in the absence of ownership from the sample of twin renter households. It implies that all variables that influence the savings behaviour and the ownership status of a household are known and available in the data set (see Aerts and Schmidt (2008)). Unfortunately the CIA cannot be validated empirically (Almus et al. (1999)).

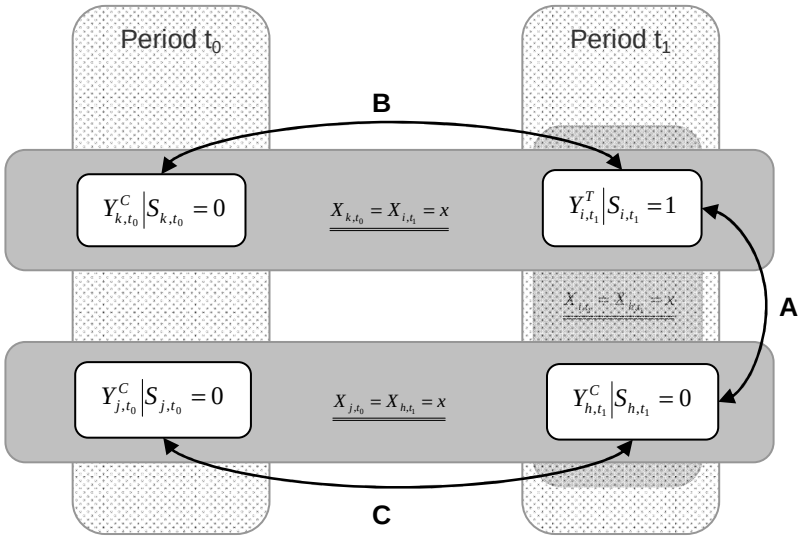
The methodology described above is applicable to cross-sectional data, but can be combined with panel approaches (see e.g. Aerts and Schmidt (2008) for an overview), which has the additional benefit, that it is possible to control for observed and unobserved heterogeneity. Heckman et al. (1998) and Blundell and Costa Dias (2000) labeled these methods "conditional diff-in-diff" and "matching with diff-in-diff" respectively. The idea is to mimic - in a matching context - the difference in difference approaches usually applied to panel data. That is, households are matched within and across waves to control for observed and unobserved heterogeneity. Given that our sample sizes in the panel are too small for applying a diff-in-diff estimation directly, i.e. without matching, to our data[8], we resort to the

[7] Only two households owning their main residence and paying back a mortgage had to be deleted from the sample because of lack of "common support".

[8] Only 84 households in the PHF panel switched from renting to owning between wave 1 and 2.

conditional diff-in-diff matching approach. Figure 2 below summarizes the main idea of this approach.

Figure 2 Conditional diff-in-diff



$$ATT^{CDiDRCS} = \left(E(Y^T_{i,t_1}|X_{i,t_1}=x, S_{i,t_1}=1) - E(Y^C_{k,t_0}|X_{k,t_0}=x, S_{k,t_0}=0)\right) - \left(E(Y^C_{h,t_1}|X_{h,t_1}=x, S_{h,t_1}=0) - E(Y^C_{j,t_0}|X_{j,t_0}=x, S_{j,t_0}=0)\right)$$

Source: Aerts and Schmidt (2008)

The approach requires three matching estimations that are done according to the procedure described above. First, a matching within wave 2 is conducted (A). This matching accounts for the selection on observables and is necessary to identify the group of renters from wave 2 that serve as the control group for homeowners with a mortgage from wave 2. Second, the owners with a mortgage in wave 2 are matched to renters in wave 1 with similar characteristics (B). This matching mimics the classical diff-in-diff approach, i.e. we observe the "same" households as owner and renter at two points in time, and we control for individual specific effects that do not change over time. Third, the group of matched renters from matching (A) are matched with comparable renters in wave 1 (C). The idea for this matching is to control for a common (macro-economic) trend and tries to answer the question how the savings behavior of the household with a mortgage would have changed even if it had not become a homeowner. The results of matching B and C are then combined to estimate the average treatment effect of the treated according to the formula given above.

There are some methodological issues to overcome: First, the matching is performed with replacement, i.e. the sample for matching C is smaller than the number of homeowners with mortgage (treated group for matching A). This means that the results of matching C have to be weighted to come up with comparable savings figures. Second, common support has to be given in all matching stages and third, the propensity score model needs to be applicable to all matchings.

Besides the technical issues there are also substantive considerations. Given the fact that we match owners with a mortgage to similar renters in previous waves with a similar propensity to own a property, it is feasible to assume that among those renters are several planning to buy property in the (near) future. If the renters with a purchase motive save more than renters without a purchase motive (low probability to buy) we will underestimate the treatment effect. Ideally we would like to observe renters before they decide to buy a home. Descriptive statistics from the PHF survey show that renters with a motive to buy property save more than twice as much as renters not planning to buy property.

The description of the matching procedure above focused on the matching of homeowners with a mortgage with renters. We repeat the same procedure two times to also match owners without a mortgage to renters and owners without a mortgage to owners with a mortgage. The additional treatment effects allow us to gain some indicative insights into how homeowners adjust their savings once they have paid of their mortgage.

The unweighted sample sizes for our analysis are as follows: of the 3,565 households participating in 2010 about 56% or 2,013 households own their main residence, 1,552 (44%) are renters. Only 40% (812 households) of those owners still have to pay back a mortgage. For wave two from 2014 the share of renters in the raw data is slightly lower (41% - 1,840 households) than in 2010. Accordingly 69% of households (2 621) own the main residence, of which 39% (1 027 households) pay back a mortgage. In the matching procedure only a subsample of all households is taken into account. To give an example, for the analysis of owners with a mortgage and renters, owners without a mortgage are not considered.

5. Results

Before we turn to the substantive results, we first evaluate the propensity score estimation and the matching as a whole.

Propensity score estimation and evaluation of the matched samples

At the beginning of the matching process we need to estimate the probability of households to own property, i.e. the propensity score. In order to estimate this likelihood, we specify a probit regression model with an independent dummy variable, which in the baseline case is one if the household owns its main residence and is paying back a mortgage and zero if the household is a renter.[9] In the two additional matchings the dependent variables are indicators for owners with a mortgage and owners without a mortgage, respectively. The results for the three different cross-sectional matching estimations of a) owners with a mortgage to renters, b) owners without a mortgage to renters, c) owners with to owners without a mortgage are presented in table 6 in the appendix.

The estimations yield the expected results, households with higher income, higher education, married couples and households that received a substantial gift/inheritance in the past are more likely to own their main residence. This is also true for households that own other property, did not move in the last three years and live outside of the city center. The age of the main income earner seems to mainly distinguish between owners without a mortgage and renters within the matching samples.

Important for the matching procedure to work is that the independent variables included in the propensity score estimation explain the dependent variable well. The R2 for all three equations is similar and in a range usually observed in micro-econometric analysis. We therefore are confident that the matching on the propensity score will work.

Before we proceed to the substantive results, we also compare the means for the independent variables included in the propensity score matching. Tables 7-10 in the appendix present the results. The comparison between the control and treatment group after the matching shows, that the matching principle works. In all stages and for all subsets of the matching procedure we are able to match households with the same or a very similar propensity scores (Table 7). Furthermore, the differences in the variables we want to equate between treated and control

[9] Note that the propensity score estimations are performed for subsamples of the total sample of the PHF. In the baseline case, e.g. only owners with a mortgage and all renter households are included, but not owners without a mortgage.

group are insignificant in almost all cases. For the matching of owners with a mortgage to renters we are left with a difference in the share of two-person households after matching, for the matching of owners with and without mortgages education levels and mobility still differ and for the matching of owners with a mortgage to renters the education levels differ. Despite these differences we think that we are now comparing similar groups of households, which differ in their ownership status.

Matching Results

The results presented in table 5 below show that ownership is indeed accompanied by higher savings, regardless of whether we look at gross or net savings. Renter households save approximately 6,200 euros a year or 500 euros per month less in net terms than similar households that own their main residence and repay a mortgage, if mortgage repayments on the household main residence (HMR) are taken into account. The differences are highly significant confirming hypothesis one. If one looks at the narrower savings concept and excludes mortgage repayments, owners with a mortgage save virtually the same in net terms than the renters. The differences are not significant. What this indicates is that owner households do not seem to substitute their savings flows into financial assets for mortgage payments. This result shows that households do not really change their savings behavior in general but change their consumption behavior. Hence, the long term commitment of households for redemption payment can be interpreted as a disciplinary device to force saving. Our second hypothesis is therefore also confirmed.

Table 5 Matching Results – Comparison of means between treated and control group

		Owners with mortgage vs. renters		Owners with vs. owners without mortg.		Owners without mortgage vs. renters	
	Variable	ATT	Sign.	ATT	Sign.	ATT	Sign.
Gross Savings	Savings flows without any repayments	1163		-575		2454	***
	Only consumer loan repayments included	1224		-439		2090	***
	Only mortgage repayments included	7314	***	5757	***	2485	***
	All repayments included [1)]	7370	***	5888	***	2121	***
Net Savings	Savings without any repayments	-15		-2135	***	2112	***
	Only consumer loan repayments included	45		-2001	***	1759	***
	Only mortgage repayments included	6118	***	4179	***	2143	***
	All repayments included [1)]	6177	***	4313	***	1789	***

Source: PHF 2010-11 and PHF 2014, implicate 1.

Notes: All values are annual amounts in Euro. *** 99% significance level [1)] excl. mortgages on other properties

Comparing the owners with a mortgage to owners without and outright owners to renters yields some additional interesting insights into the impact of homeownership on households' savings behavior. Owners without a mortgage save on average less than owners with a mortgage, confirming hypothesis 3. Again, the difference shows up, once mortgage payments are included in the saving flows concept. However, owners without a mortgage save on average about 2000 euros more (net) per year in financial assets than comparable owners with a mortgage. Taken together this indicates that homeowners that have repaid their mortgage do not adjust their consumption and savings levels back to those observed for comparable renters, but keep their savings elevated even after they have repaid their mortgage. The results

for the comparison between owners without a mortgage and renters support this assessment. Owners without a mortgage save more than comparable renters, confirming hypothesis 4. We can only speculate why this is the case, but maybe repaying a mortgage for an extended period of time influences the households' preferences and habits.

6. Conclusions and Future Research

In this paper we analyze the differences in savings behavior of households in Germany. We use the PHF and its large number of questions on savings to shed light on the differences in savings behavior between households owning their main residence and renter households. This is an essential topic if one wants to understand the different wealth levels observed for these groups.

We show that households which own their main residence do save more than comparable households that do not. The main reason for this seems to be the fact that owner households do not substitute financial savings flows with mortgage repayments, but save on top. This is plausible for two reasons: first, a large part of the savings of households in Germany is usually saved in long term contracts (e.g. pension contracts, whole-life insurance), which are costly to terminate prematurely. If the household can afford to pay the mortgage rates and interest, without dissolving long term contracts, it has every incentive to do so. Second, banks in Germany usually require their borrowers to pay back at least some part of the mortgage loan each month, i.e. households have virtually no option to just pay interest. This system can be seen as inducing some forced savings for owner households.

The differential savings rates of owners and renters can have implication for aggregate consumption/savings levels. Ceteris paribus, the savings rate would be higher if more households owned their homes. Our results show that this is true not only while households repay mortgages, but homeownership seems to lead to elevated savings levels even after a mortgage has been paid off. This might be due to a learning effect or the retirement savings puzzle at work that prevents older (outright) owners to liquidate their wealth. An increasing homeownership rate may alter total savings by the household sector in Germany. Policies that affect homeownership rates can thus also affect the aggregate savings level in the long run.

Appendix

Table 6: Probit Estimation for probability to own household main residence, repay mortgage and rent

	Owners with mortgage (=1) vs. all renters	Owners with mortgage (=1) vs. owners without	Owners without mortgage from column 2 (=1) vs. renters
Household net income	0.000 ***	0.000 ***	0.000 ***
	[0.000]	[0.000]	[0.000]
Household Size 2	0.369 ***	0.081	0.483 ***
	[0.087]	[0.099]	[0.100]
Household Size 3	0.690	0.287	0.652
	[0.106]	[0.118]	[0.127]
Household Size 4+	0.860	0.358	0.714
	[0.110]	[0.120]	[0.133]
Married Couple	0.338 ***	0.013	0.349 ***
	[0.076]	[0.087]	[0.092]
Main Income Earner: Age	0.001	-0.044 ***	0.006 **
	[0.002]	[0.003]	[0.003]
Main Income Earner: Medium Education (ISCED 3+4)	0.549 ***	-0.114	0.600 ***
	[0.138]	[0.182]	[0.165]
Main Income Earner: High Education (ISCED 5+6)	0.688 ***	-0.112	0.670 ***
	[0.141]	[0.183]	[0.169]
Main Income Earner: Unemployed	-0.882 ***	-0.574	-0.942 ***
	[0.255]	[0.364]	[0.338]
Willingness to take risk (score 0-10)	0.004	0.058 ***	0.006
	[0.013]	[0.013]	[0.015]
Patience (score 0-10)	0.013	-0.010	0.011
	[0.011]	[0.012]	[0.013]
Household received gift/inheritance in the past	0.346 ***	-0.08	0.388 ***
	[0.061]	[0.058]	[0.072]
Household moved within last three years	-0.632 ***	0.64 ***	-0.971 ***
	[0.105]	[0.200]	[0.165]
Household owns other property	0.233 ***	-0.263 ***	0.394 ***
	[0.069]	[0.060]	[0.08]
Households lives in East Germany	-0.061	0.038	-0.136
	[0.071]	[0.078]	[0.084]
Household lives in city centre	-0.563 ***	-0.012	-0.473 ***
	[0.057]	[0.059]	[0.069]
Constant	-2.056 ***	2.027 ***	-2.548 ***
	[0.207]	[0.266]	[0.247]
Observations	2791	2505	2283
Log-Likelihood	-1333.3521	-1344.0032	-921.776
Pseudo – R2	0.267	0.202	0.222

Source: PHF 2010-11 and PHF 2014, implicate 1, coefficients, standard errors in brackets.

Table 7: Propensity Scores – matched vs. unmatched samples

Owners with a mortgage vs renters						
			Owners with a mortgage/Treated	Renters/Control	t-value	p>t
MATCH A	Propensity Score	Unmatched	0.556	0.244	36.460	0.000
		Matched	0.554	0.554	0.000	0.997
MATCH B	Propensity Score	Unmatched	0.634	0.237	41.580	0.000
		Matched	0.632	0.632	-0.010	0.994
MATCH C	Propensity Score	Unmatched	0.374	0.190	20.900	0.000
		Matched	0.371	0.371	0.000	0.997
Owners with a mortagega vs owners without a mortgage						
Owners with a mortagega vs owners without a mortgage			Owners with a mortgage/Treated	Owners without a mortgage/Control		
MATCH A	Propensity Score	Unmatched	0.546	0.297	28.720	0.000
		Matched	0.543	0.543	0.000	0.999
MATCH B	Propensity Score	Unmatched	0.594	0.355	25.840	0.000
		Matched	0.592	0.592	0.010	0.994
MATCH C	Propensity Score	Unmatched	0.368	0.272	12.870	0.000
		Matched	0.367	0.367	0.000	0.997
Owners without a mortgage vs. renters						
			Owners without a mortgage/Treated	Renters/Control		
MATCH A	Propensity Score	Unmatched	0.546	0.297	28.720	0.000
		Matched	0.543	0.543	0.000	0.999
MATCH B	Propensity Score	Unmatched	0.594	0.355	25.840	0.000
		Matched	0.592	0.592	0.010	0.994
MATCH C	Propensity Score	Unmatched	0.368	0.272	12.870	0.000
		Matched	0.367	0.367	0.000	0.997

Table 8: Control variables for propensity score model owners with mortgage vs. renters in 2014 – matched vs. unmatched10

		Mean		T-Test	
		Owners with a mortgage /Treated	Renters/ Control	t	p>t
Propensity Score	Unmatched	0.556	0.244	36.46	0.000
	Matched	0.554	0.554	0.000	0.997
Household net income (monthly)	Unmatched	4493	2370	14.34	0.000
	Matched	4246	4260	-0.11	0.913
Household Size 2	Unmatched	0.384	0.381	0.16	0.875
	Matched	0.383	0.420	-1.69	0.09
Household Size 3	Unmatched	0.208	0.120	6.26	0.000
	Matched	0.207	0.195	0.67	0.502
Household Size 4+	Unmatched	0.323	0.113	14.08	0.000
	Matched	0.324	0.301	1.11	0.266
Married Couple	Unmatched	0.838	0.528	17.18	0.000
	Matched	0.838	0.840	-0.12	0.903
Main Income Earner: Age	Unmatched	51.9	51.2	1.18	0.239
	Matched	51.9	52.3	-0.58	0.561
Main Income Earner: Medium Education (ISCED 3+4)	Unmatched	0.430	0.537	-5.46	0.000
	Matched	0.431	0.423	0.36	0.717
Main Income Earner: High Education (ISCED 5+6)	Unmatched	0.547	0.355	9.99	0.000
	Matched	0.546	0.556	-0.45	0.652
Main Income Earner: Unemployed	Unmatched	0.005	0.055	-6.71	0.000
	Matched	0.005	0.002	1.14	0.256
Willingness to take risk (score 0-10)	Unmatched	4.155	3.845	3.37	0.001
	Matched	4.158	4.029	1.27	0.205
Patience (score 0-10)	Unmatched	4.732	4.511	2.15	0.032
	Matched	4.732	4.639	0.81	0.416
Household received gift/inheritance in the past	Unmatched	0.450	0.252	10.91	0.000
	Matched	0.448	0.453	-0.23	0.822
Household moved within last three years	Unmatched	0.050	0.162	-8.73	0.000
	Matched	0.050	0.046	0.42	0.676
Household owns other property	Unmatched	0.328	0.145	11.62	0.000
	Matched	0.328	0.311	0.82	0.414
Households lives in East Germany	Unmatched	0.161	0.250	-5.48	0.000
	Matched	0.160	0.145	0.94	0.349
Household lives in city centre	Unmatched	0.356	0.584	-11.82	0.000
	Matched	0.357	0.342	0.66	0.51

Source: PHF 2014, implicate 1

[10] In the appendix we only report the comparison of matched and unmatched samples for matching A (see Figure 2). Additional comparisons (matchings B and C) are available upon request. Table 7 above reports the propensity score comparison only for all matches.

Table 9: Control variables for propensity score model owners with mortgage vs. model owners without mortgage in 2014 – matched vs. unmatched[11]

		Mean		T-Test	
		Owners with a mortgage /Treated	Owners without a mortgage / Control	t	p>t
Propensity Score	Unmatched	0.546	0.297	28.72	0.000
	Matched	0.543	0.543	0.000	0.999
Household net income (monthly)	Unmatched	4493	3524	5.54	0.000
	Matched	4245	4348	-0.65	0.518
Household Size 2	Unmatched	0.384	0.613	-11.54	0.000
	Matched	0.383	0.412	-1.33	0.183
Household Size 3	Unmatched	0.208	0.113	6.57	0.000
	Matched	0.209	0.205	0.17	0.868
Household Size 4+	Unmatched	0.323	0.111	13.56	0.000
	Matched	0.323	0.295	1.36	0.173
Married Couple	Unmatched	0.838	0.865	-1.89	0.059
	Matched	0.838	0.826	0.72	0.471
Main Income Earner: Age	Unmatched	52.0	64.6	-26.16	0.000
	Matched	52.0	51.7	0.6	0.55
Main Income Earner: Medium Education (ISCED 3+4)	Unmatched	0.430	0.439	-0.48	0.634
	Matched	0.432	0.485	-2.35	0.019
Main Income Earner: High Education (ISCED 5+6)	Unmatched	0.547	0.531	0.8	0.421
	Matched	0.545	0.491	2.39	0.017
Main Income Earner: Unemployed	Unmatched	0.005	0.007	-0.7	0.485
	Matched	0.005	0.004	0.33	0.738
Willingness to take risk (score 0-10)	Unmatched	4.155	3.598	6.26	0.000
	Matched	4.148	4.180	-0.34	0.735
Patience (score 0-10)	Unmatched	4.732	4.785	-0.54	0.586
	Matched	4.726	4.564	1.5	0.135
Household received gift/inheritance in the past	Unmatched	0.450	0.496	-2.25	0.024
	Matched	0.451	0.443	0.36	0.718
Household moved within last three years	Unmatched	0.050	0.008	6.72	0.000
	Matched	0.045	0.029	1.79	0.074
Household owns other property	Unmatched	0.328	0.423	-4.81	0.000
	Matched	0.331	0.346	-0.71	0.476
Households lives in East Germany	Unmatched	0.161	0.156	0.33	0.742
	Matched	0.159	0.183	-1.43	0.152
Household lives in city centre	Unmatched	0.356	0.415	-2.94	0.003
	Matched	0.355	0.394	-1.77	0.077

Source: PHF 2014, implicate 1

[11] In the appendix we only report the comparison of matched and unmatched samples for matching A (see Figure 2). Additional comparisons (matchings B and C) are available upon request. Table 7 above reports the propensity score comparison only for all matches.

Table 10: Control variables for propensity score model owners with mortgage vs. model owners without mortgage in 2014 – matched vs. unmatched[12]

		Mean		T-Test	
		Owners with a mortgage /Treated	Renters/ Control	t	p>t
Propensity Score	Unmatched	0.546	0.297	28.72	0.000
	Matched	0.543	0.543	0.000	0.999
Household net income (monthly)	Unmatched	4493	3524	5.54	0.000
	Matched	4245	4348	-0.65	0.518
Household Size 2	Unmatched	0.384	0.613	-11.54	0.000
	Matched	0.383	0.412	-1.33	0.183
Household Size 3	Unmatched	0.208	0.113	6.57	0.000
	Matched	0.209	0.205	0.17	0.868
Household Size 4+	Unmatched	0.323	0.111	13.56	0.000
	Matched	0.323	0.295	1.36	0.173
Married Couple	Unmatched	0.838	0.865	-1.89	0.059
	Matched	0.838	0.826	0.72	0.471
Main Income Earner: Age	Unmatched	52.0	64.6	-26.16	0.000
	Matched	52.0	51.7	0.6	0.55
Main Income Earner: Medium Education (ISCED 3+4)	Unmatched	0.430	0.439	-0.48	0.634
	Matched	0.432	0.485	-2.35	0.019
Main Income Earner: High Education (ISCED 5+6)	Unmatched	0.547	0.531	0.8	0.421
	Matched	0.545	0.491	2.39	0.017
Main Income Earner: Unemployed	Unmatched	0.005	0.007	-0.7	0.485
	Matched	0.005	0.004	0.33	0.738
Willingness to take risk (score 0-10)	Unmatched	4.155	3.598	6.26	0.000
	Matched	4.148	4.180	-0.34	0.735
Patience (score 0-10)	Unmatched	4.732	4.785	-0.54	0.586
	Matched	4.726	4.564	1.5	0.135
Household received gift/inheritance in the past	Unmatched	0.450	0.496	-2.25	0.024
	Matched	0.451	0.443	0.36	0.718
Household moved within last three years	Unmatched	0.050	0.008	6.72	0.000
	Matched	0.045	0.029	1.79	0.074
Household owns other property	Unmatched	0.328	0.423	-4.81	0.000
	Matched	0.331	0.346	-0.71	0.476
Households lives in East Germany	Unmatched	0.161	0.156	0.33	0.742
	Matched	0.159	0.183	-1.43	0.152
Household lives in city centre	Unmatched	0.356	0.415	-2.94	0.003
	Matched	0.355	0.394	-1.77	0.077

Source: PHF 2014, implicate 1

[12] In the appendix we only report the comparison of matched and unmatched samples for matching A (see Figure 2). Additional comparisons (matchings B and C) are available upon request. Table 7 above reports the propensity score comparison only for all matches.

Literature

Aerts, K. and T. Schmidt (2008), Two for the price of one? Additionality effects of R&D subsidies: A comparison between Flanders and Germany, *Research Policy* 37 (5), 806-822.

Almus, M., J. Egeln, M. Lechner, F. Pfeiffer, and H. Spengler (1999), *Wirkungen Gemeinnütziger Arbeitnehmerüberlassung in Rheinland-Pfalz*, Nürnberg.

Attanasio, O. Leicester, A. and M. Wakefield (2011), Do House Prices drive Consumption Growth? The Coincident Cycles of House Prices and Consumption in the UK, Journal of the European Economic Association 9(3), 399-435.

Attanasio, O., Blow, L., Hamilton, R. and A. Leicester (2009), Booms and Busts: Consumption, House Prices and Expectations, Economica 76, 20-50.

Attanasio, O. and G. Weber (1994), The UK consumption boom of the late 1980s: Aggregate Implications of Microeconomic Evidence, The Economic Journal 104 (427), 1269-1302.

Campbell, J. and J. Cocco (2007), How do house prices affect consumption? Evidence from micro data, Journal of Monetary Economics 54, 591-621.

Chiuri, M. and T. Jappelli (2003), Financial Market Imperfections and Home Ownership: A Comparative Study, European Economic Review 47 (5), 857-875.

Cocco, J. (2004), Portfolio Choice in the Presence of Housing, The Review of Financial Studies 18 (2), 535-550.

Czarnitzki, D., B. Ebersberger, and A. Fier (2007), The Relationship between R&D Collaboration, Subsidies and Patenting Activity: Empirical Evidence from Finland and Germany, *Journal of Applied Econometrics* 22, 1347-1366.

Dehejia, R. and S. Wahba (2002), Propensity score matching methods for nonexperimental causal studies., *Review of Economics and Statistics* 84 (1), 151-161.

Di, Z.X, E. Belsky and X. Liu (2007), Do homeowners achieve more household wealth in the long run? Journal of Housing Economics 16 , 274-290.

Dietz, R. and R.Haurin (2003) , The social and private micro-level consequences of homeownership., Journal of Urban Economics 54, 401-450.

Engelhardt, G. (1996), House prices and home owner saving behaviour, Regional Science and Urban Economics 26 , 313-336.

Fröhlich, M. (2007), Propensity score matching without conditional independence assumption—with an application to the gender wage gap in the United Kingdom, *The Econometrics Journal* 10 (2), 359-407.

Goodman, J. (1997), The costs of owning and renting housing: 1985-1995. National Multi Housing Council Working Paper.

Gross, I. (2017), Anticipated Changes in Household Debt and Consumption, mimeo.

Grunert, R. (2003), Sind Haushalte mit Wohneigentum sparsamer als Miethaushalte?, IWH Working Paper Nr. 171

Heckman, J. J., H. Ichimura, and P. E. Todd (1998), Matching as an econometric evaluation estimator, *Review of Economic Studies* 65 (2), 261-294.

Heckman, J. J., R. J. Lalonde, and J. A. Smith (1999), The economics and econometrics of active labor market programs, in: A. Ashenfelter and D. Card (eds), *Handbook of labor economics 3*, Amsterdam, 1866-2097.

HFCN (2013), *The Eurosystem Household Finance and Consumption Survey-Results from the first wave*, ECB Statistics Paper Series 2, ECB, Frankfurt am Main.

Hurst, E. , M. Luoh and F. Stafford (1998), The Wealth Dynamics of American Families, 1984-94, Brooking s Papers on Economic Activity, 1: 1998.

Kovacs, A. and P. Moran (2017), Temptation, Commitment, and Hand-to-Mouth Consumers, mimeo.

Krumm, R. and A. Kelly (1989), Effects of Homeownership on Household Savings, Journal of Urban Economics 26, 281-294.

Lechner, M. (1998), *Training the East German labor force: microeconometric evaluations of continuous vocational training after unification*, Heidelberg.

Lechner, M. (1999), Earnings and Employment Effects of Continuous Off-the-Job Training in East Germany after Unification, *Journal of Business & Economic Statistics* 17, 74-90.

Lechner, M. (2002), Program Heterogeneity and Propensity Score Matching: An Application to the Evaluation of Active Labor Market Policies, *Review of Economics and Statistics* 84, 205-220.

Nakajima, M. and I. Telyukova (2015), Housing in Retirement across Countries. In: Contemporary Issues in Microeconomics.

Olafsson, A. and M. Pagel (2017), The Retirement-Consumption Puzzle: New Evidence on Individual Spending and Financial Structure. mimeo.

Rosenbaum, P. R. and D. B. Rubin (1983), The Central Role of the Propensity Score in Observational Studies for Causal Effects *Biometrika* 70 (1), 41-55.

Rosenbaum, P. R. and D. B. Rubin (1985), Constructing a Control Group Using Multivariate Matched Sampling Methods That Incorporate the Propensity Score, *The American Statistician* 39 (1), 33-38.

Rubin, D. B. (1977), Assignment to Treatment Group on the Basis of a Covariate, *Journal of Educational Statistics* 2, 1-26.

Sheiner, L. (1995), Housing Prices and the Savings of Renters, Journal of Urban Economics 38, 94-125.

Smith, J. A. and P. E. Todd (2001), Reconciling Conflicting Evidence on the Performance of Propensity-Score Matching Methods, *American Economic Review* 91, 112-118.

Von Kalckreuth, U., M. Eisele, J. Le Blanc, T. Schmidt, and J. Zhu (2012), *The PHF: a comprehensive panel survey on household finances and wealth in Germany*, Bundesbank Discussion Paper, Series 1, Frankfurt am Main.

Yang, F. (2009), Consumption over the life cycle: How different is housing?, Review of Economic Dynamics 12, 423-443.

Yao, R. and H. Zhang (2005), Optimal Consumption and Portfolio Choices with Risky Housing and Borrowing Constraints, The Review of Financial Studies 18(1), 197-239.