The Mortgage Piggy Bank, Saving Behavior and the Wealth Distribution: Evidence from Euro Area Countries

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The mortgage piggy bank, saving behaviour and the wealth distribution: evidence from euro area countries*

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Abstract

Mortgage amortization, i.e. regular debt repayment, can shape heterogeneity in saving behavior, with potentially important implications for features of the wealth distribution. Due to frictions in housing and credit markets, liquidity and credit constraints can introduce a wedge between the saving patterns of mortgaged homeowners and other households. Behavioral factors can exacerbate it. This wedge may have distributional consequences: the effect of credit constraints, as well as that of behavioral factors – namely, the need for a commitment device supporting long-term saving – might affect lower-income homeowners disproportionately. In this work I show that patterns in saving rates, and in the importance of amortization in household saving flows, observed in the HFCS data on 19 euro area countries, are consistent with such effects.

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1 Introduction

It is well known that the bulk of households' wealth is stored in their houses as 'home equity'. But it has gone largely unnoticed that a substantial part of their *saving flows* is also linked to housing: it comes from mortgage amortization, i.e. regular debt repayments. About 20% of total household saving in the euro area (25% in the US) in 2019 came through such payments.

These large percentages mask considerable heterogeneity. First, for many households – those renting or owning outright – this share is zero. Second, for the very rich, only a small part, if any, of their saving will go to repaying mortgage debt (just like the portfolio share of wealth stored in housing is comparably small for them).

Such large payments are not strictly voluntary. While it is often optimal for households to pay down their mortgage debt, regular debt repayments are generally mandatory by regulation, and fixed in potentially very long term mortgage contracts. New homeowners cannot decide on the shape of the amortization schedule over time, and most often cannot adjust debt repayment in the face of even large shocks to their incomes (or to interest rates).

Is the effect of such constraints more severe for households at the bottom of the income and wealth distributions? If it is, what does this entail for the observed heterogeneity in saving rates (and so, ultimately, the wealth distribution)? In this paper, I bring forth evidence suggesting that the effect is more severe, and that they significantly affect the relationship of saving rates with income, based on data from 19 euro area countries (from the ECB Household Finance and Consumption Survey, HFCS).

How could a substantial effect of amortization requirements be rationalized? Two broad mechanisms that could play a role. First, the welfare loss from reduced self-insurance against income shocks could be compensated by a strong enough preference for homeownership, or some gains due to frictions in rental markets. Second, present-biased households may desire a commitment device for long-term saving, and building "home equity" through housing and mortgages can provide that, similar to retirement funds. In both cases, the effects of mortgage contracts may be hard to identify, as the choice to rent or buy and enter a mortgage is endogenously affected by prices and tastes. This paper builds on recent results from macroeconomics and household finance that have overcome these difficulties and began to explore these mechanisms.

Ganong and Noel (2020) are able to study the effect of such mortgage market frictions on household saving behaviour, using a combination of detailed administrative and bank data on households facing financial distress during the Great Financial Crisis. They find that increasing the liquidity available to households in the short term, by reducing their mortgage payments, has a significant effect on their consumption/saving decisions even if such a reduction has no effect on their wealth (i.e. if the present value of their debt obligations remains unchanged), while the opposite – increasing their wealth without providing liquidity – does not. Boar et al. (2021) shed further light on the effect of these constraints in US households by studying, in a life-cycle model with idiosyncratic income risks, illiquid housing and mortgages, how their welfare is affected by payment requirements in their mortgages. They find the effect of these liquidity constraints is sub-

stantial: a one-time 8,000$ reduction in mortgage payments leads homeowner households in their model to increase consumption by about 30 cents on the dollar.

Regarding possible behavioral factors, Bernstein and Koudijs (2021) recently broke new ground, by clearly identifying that households with a mortgage save more of their income when regulation forces them to commit to regular debt repayment, i.e. amortization schedules. They exploit a recent policy change in the Netherlands, where, in contrast to most other countries, mortgages are generally interest-only. The policy change removed tax incentives for this kind of mortgages, incentivizing higher regular amortization in new loans. New homebuyers increased amortization, but did not offset it by other forms of saving, instead adjusting consumption and labor supply (even if not liquidity constrained *ex ante*).

While Bernstein and Koudijs remain agnostic on the exact mechanism behind their result, one leading candidate is a strong role of mortgages as a commitment device for long-term saving, akin to pension retirement funds. This means that otherwise rational households, aware of their own present bias in saving decisions, may desire an illiquid asset in which to store wealth, and pay the welfare cost of illiquidity in order to (later in life) reap the benefits of greater saving. Without mandatory amortization, the potential of mortgages to offer such a device may be muted. A recent literature has began to study these questions by introducing "temptation preferences" (Gul and Pesendorfer, 2001) in life cycle models with housing and mortgages, namely Kovacs and Moran (2021); Attanasio et al. (2020). They cleanly examine, at the household level, the trade-off between flexibility and commitment emerges: households benefit from the illiquidity of housing, as it alleviates the costs of temptation, but if housing is more liquid, households also gain from improved consumption smoothing and self-insurance. In their model of US households, the existence of a mandatory amortization increases wealth by 10% at the time of retirement, compared to a situation where interest-only mortgages are allowed. Also, they can explain a substantial part 'wealthy hand-to-mouth' behavior – households who have no liquid wealth, even if they have substantially illiquid wealth (in housing) – with liquidity constraints in mortgages.

The aggregate and distributional consequences of these constraints – let alone of any behavioral effects – remain to be explored. In the Euro area (US), a sizeable part of households – about 30% (40%) – faces all the constraints imposed by having a mortgage. The other 70% (60%) - renters and outright homeowners - do not. If those constraints have a significant positive effect on the saving rates of households, this could have important implications for both the long-term aggregate saving rate in the economy, and for its short term dynamics.

Such an effect can clearly have distributional consequences: the effect of credit constraints, as well as that of behavioral factors should affect disproportionately the saving rate of homeowners with lower permanent or transitory income. By shaping the heterogeneity of saving rates, it could have a potentially large effect on the shape of the wealth distribution (among the bottom 99%); further, this could help explain the observed high share of liquidity constrained households in the data.

The above mentioned studies do not examine how such effects might differ across the distri-

bution of income or wealth – even though some of the mechanisms they propose suggest lower-income households are disproportionately affected. This paper is a first attempt at complementing their results, by providing evidence that suggests that mortgage debt repayment is an important element driving saving rate heterogeneity.

Ultimately, this means that the shape of the wealth distribution can also depend on this element. As it stands, this empirical work is a first step in a broader project to investigate the effect on the wealth distribution in the frame of a quantitative model.

Further related literature

With this, I will further aim to complement a literature that documents the role of homeownership in shaping the wealth distribution. The effects of heterogeneous returns to wealth are by now well known: e.g. Kuhn et al. (2020) or Martínez-Toledano (2019) show how the middle class benefits disproportionately from capital gains in housing. I focus on a different channel, whereby housing can affect the wealth distribution through saving rates, rather than return rates.

As shown theoretically e.g. by Benhabib et al. (2015); Gabaix et al. (2016), the concentration of wealth can exceed that of (labour) income due to one (or both) of two factors: heterogeneity in either the rates of return, i.e. how quickly accumulated savings generate further wealth, (either through portfolio composition or asset-specific return rates); heterogeneity in saving rates, i.e. how quickly households build wealth out of income. A large and growing literature has been showing, both empirically (Bach et al., 2018; Fagereng et al., 2019) and quantitatively (Benhabib and Bisin, 2018; Hubmer et al., 2019), the important role of the former. In this work, we focus on the latter. Similar to returns, saving rate heterogeneity can drive inequality, through both 'type dependence' – if e.g. more patient individuals save more regardless of their wealth – and 'scale dependence' – if saving rates systematically vary with wealth. The available evidence mostly suggests saving rates increase in wealth. In the USA, Saez and Zucman (2016), based on survey and historical data, suggest the rich save more in the US, a pattern Dynan et al. (2004) had previously noted in PSID data. More recently, with rich administrative data, Fagereng et al. (2019) show how, in Norway, passive saving through capital gains leads to a strong positive relationship between saving rates and wealth. Epper et al. (2020) show, with Danish data, that more patient individuals become wealthier, due to their stronger propensity to save.

Structure of the paper

This paper , in its current form, is an exploratory analysis of the HFCS data, that uncovers patterns in household saving which appear to be consistent with a heterogeneous effect of constraints related to mortgage repayment. In Section 2, I very briefly lay out some theoretical predictions related to this. Section 3 presents the data and some first patterns. Section 4 presents my simple approach to controlling for the life cycle and other factors when looking at saving rates. Section 5 shows some initial results. Section 6 concludes.

2 How can mortgage design influence household saving patterns?

[Very preliminary]

In a standard life cycle model of household saving, when a household is hit with a negative income shock, it is optimal to reduce saving if the shock is not permanent. A mortgage payment, including debt repayment, would in this context impose a 'hard' constraint on saving. Further, the transaction costs involved in selling a house, or refinancing the mortgage, become larger relative to income. A household can, in this situation end up "over-saving": it would better off if could save less (into its illiquid home equity) but the high costs involved prevent it from fully readjusting its saving behavior.

In this scenario, the household might compensate for this lack of flexibility by saving less into liquid assets (than it would be optimal absent frictions in mortgages). Note that a given household could end up in this situation as a result of perfectly rational decisions, or even with perfect foresight. Depending on the rental rate (or house price-to-rent ratio), and the interest rate on mortgage loans, it might be optimal for a household to buy a house and enter such a contract, regardless of the costs of 'over-saving'.

On the behavioral side, I rely mostly on the theory and model results of Kovacs and Moran (2021) (studying the related, but slightly different issue of 'home equity withdrawal', i.e. mortgage refinancing, rather than amortization). A clear conclusion from their papers is the trade-off between flexibility and commitment that emerges in the presence of present bias and mortgage contracts. Households benefit from the illiquidity of housing, as it alleviates the costs of temptation, but if housing were more liquid, households would also gain from improved consumption smoothing and self-insurance. If home equity extraction is allowed (giving greater flexibility), working age households use it, which decreases aggregate saving (saving rate $\downarrow$ 2.5 p.p.) and the accumulated wealth at retirement (by 15%).

These impacts are heterogeneous depending on the path of households' income over the life cycle. Households with low initial income and high income growth are better off with greater flexibility, while those high initial income, but low income growth are worse off. Further Attanasio et al. (2020) also show that temptation costs decrease in permanent income.

My take is that both classes of models suggest distributional implications going broadly in the same direction, regarding the effect of mortgage amortization rules. From a liquidity constraint/market frictions perspective, liquidity constraints will bind more often for low permanent income households with a mortgage; these will more often end up 'over-saving'. The same applies to households hit with large negative shocks (who necessarily will be at the bottom of the income distribution) or young households in the beginning of life. From the behavioral side, temptation costs decrease in permanent income, and the gains from locking away wealth highest at the beginning of life.

Under this reasoning, we would expect to see households at the bottom of the income/wealth distributions: displaying higher saving conditional on having a mortgage, and mortgage payments taking up a larger share of their saving (as opposed to liquid assets).

3 Data on mortgages and saving in euro area countries

Eurosystem Household Finance and Consumption Survey (HFCS)

The HFCS is a representative survey of euro area households, akin to the SCF in the United States, collecting data at the household level with a common methodological framework, that allows for adequate comparison across countries. Three waves have been collected so far, roughly corresponding to the years 2011, 2014 and 2017, respectively.[1]

While the main focus of the survey is on household balance sheets, which are captured in great detail, making available the disaggregated portfolio of each household, including different financial instruments, but also non-financial wealth, including housing and business assets. The different liabilities of households are measured in detail as well, comprising both mortgages and other loans to financial institutions. For waves 2 and 3, and the vast majority of counties, the survey includes a high level of detail on these loans, such as amounts, payments and interest rates for individual loans.

The survey also includes some data on consumption and income, although with some limitations. The consumption data includes regular consumption expenditures but also consumption of non-durables, purchases of vehicles and housing rents. The income data includes labor income, various social transfers including public pensions, and capital income (e.g. interests and dividends from financial investments).

3.1 Homeownership and mortgage institutions in the euro area

The rate of home ownership is reasonably high in the euro area, while being very diverse across countries (not unlike, but more than, across US states). In most countries, it is reasonably high, around 70%, with a few small countries showing extremely high rates, north of 80%. But most importantly, a group of 'core' countries shows significantly lower rates: Germany, Austria, France and the Netherlands. (These numbers are fully based on the HFCS, differing slightly from other sources, such as EU-SILC.) Also, as previous studies (e.g. Kaas et al., 2019) have revealed, largely based on the HFCS data, there is a negative correlation between the measured inequality of wealth and the rate of homeownership in the euro area. These stylized facts are summarized in Figure 1. (All figures and tables report to data from the HFCS, unless otherwise indicated.)

[1] Data from Wave 4 of the HFCS, corresponding to the period 2020, is expected to be released by end 2023.

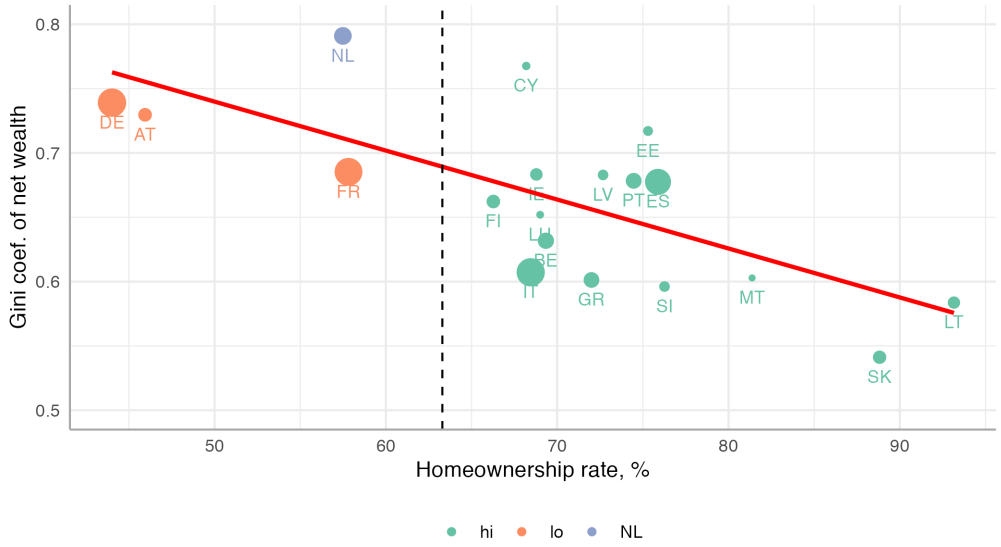

Figure 1: Homeownership rates and wealth inequality in euro area countries
Note: the red, solid line is a simple regression line; the black, dashed line marks the euro area average (weighted by the no. of households, which are represented in the plot by the size of the bubbles).

The reasons for this large diversity in homeownership have long been studied with no definitive conclusion arising thus far. For the purposes of this study, I take it as granted that some kind of 'deep parameter' difference, whether related to institutions or preferences, leads to the emergence of these two 'models', one 'German/core' model where a large part of the population rents rather than buy, and a 'Italian/periphery' model with high homeownership rates.

For these reasons, in the ensuing analyses I split countries in three groups: two groups of countries with "high" and "low" homeownership rates, respectively above or below the euro area average. I further single out the case of the Netherlands (NL), due to the specific features of its mortgage institutions.

Mortgage markets are relatively diverse across euro area countries, with quite different legislations, commercial practices and macroprudential policy rules in place. An important example is the dominant type of interest rate: in some countries, most mortgages are long-term fixed-rate, similar to the US, while in others, the dominant contract is adjustable rate or fixed with a short reset period. The markets do share some features, however. With few exceptions, loan maturities at origination are typically between 20 and 30 years, both for first-time and second home buyers (European Mortgage Federation, 2019a).

Most relevant for our purposes is the amortization schedule. Generally, amortization schedules are fixed at the beginning of the loan, in a "French loan" system where the monthly payment is constant (other than interest rate changes) such that the debt repayment component grows over time. With very few exceptions, all mortgages are fully amortizing, i.e. the repayment schedule is set such that the loan will be fully repaid at maturity. The Netherlands are the only euro area country where *interest only* mortgages have traditionally been both allowed by regulation and

remain highly popular. In a few other countries, they are allowed in some cases but play a marginal role (European Mortgage Federation, 2019b) .

Until 2013, where a reform to the mortgage interest tax deduction changed the incentives for new homeowners, almost all mortgage issuance was of this kind in the Netherlands. As of 2017, around 40% of new mortgages, and about three quarters of the outstanding mortgage debt stock was interest-only, with a small amortization component, or a hybrid form (Romano, 2017).

3.2 Measuring saving rates in the HFCS

The HFCS does not directly record information on household saving flows nor on mortgage amortization. The approach taken here is to, using some simplifying assumptions, calculate these variables based on other quantities reported by households in the survey. Although the resulting estimates suffer from measurement issues and can hardly be taken as precise in terms of levels, the hope is they can provide a sufficiently reliable picture of their distributions.

Household saving is calculated as the residual from income and consumption. Both are not measured easily in the HFCS. I mostly take from the approaches of Slacalek et al. (2020) and Tzamourani (2021) in adjusting the data to obtain a (rough) estimate of household net income and saving flows. The income before taxes data available in the HFCS is adjusted using information on tax wedges by income decile from EUROMOD (2020).

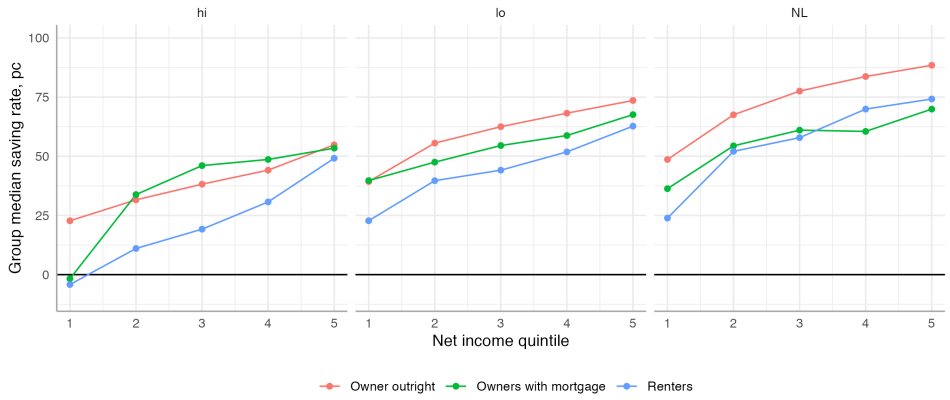

Figure 2: Saving rates over the income distribution, HFCS wave 3

Figure 3: Saving rates over the wealth distribution, HFCS wave 3
Note: there are only 2 observations in the bottom two quintiles owning outright in NL, so these estimates are not computed.

For a first look at the saving rates obtained from these procedures, I focus on wave 3, splitting the sample by country group and by housing status: homeowner households with a mortgage, owners outright, and renters. The obtained distributions are shown in Figures 2 and 3. Saving rates increase with income, but are relatively flat over the wealth distribution. As expected, renters save less than owners across the board. Between mortgagors and owners outright, there is a clear difference between countries. In the high-homeownership countries, generally homeowners with a mortgage display higher saving rates than owners outright. The opposite is observed in the low-homeownership countries, with the notable exception of the bottom quintile by both income and wealth. In the Netherlands, mortgaged homeowners save significantly less than owners outright (in some cases even saving less than renters), including at the bottom quintile.

3.3 Mortgages in the HFCS

The HFCS contains a great deal of information on households' mortgage loans. For up to 3 different loans, there are details including the purpose of the loan, any previous refinancing, the original and remaining loan amount and maturity, the type (adjustable or fixed) and current level of interest rate and, importantly, the regular monthly payment.

Computing mortgage amortization in the HFCS data

Although debt repayments are not reported directly, the information reported allows to estimate them at the observation level. To calculate the annual loan amortization for household i, we can simply compute the residual:

$$\text{amortization}_i = \sum_l \left(12 \times \text{mtp}_{i,l} - r_{i,l} \times D_{i,l}\right), \; l = 1, 2, 3$$

where mtp is the reported regular monthly payment, r the reported annual interest rate and D

the outstanding debt amount, for up to 3 different mortgage loans l.

This measure is potentially affected by a timing issue: if a household follows the regular amortization schedule, and survey collection coincides with the last year of the mortgage, the amortization for that household will be over estimated (as it would actually not make 12 payments in a year). Further, there seems to be an issue with collection, where in some cases there are very large payments reported, as if households reported large exceptional pre-payments incorrectly (as the question refers to *regular monthly* payments). I clean such cases from the sample. I also remove Italy from the sample, as the data from several questions on mortgage loans are missing.

To my knowledge, this is the first time amortization estimates based on the HFCS data are reported. From a first look, the figures obtained through this procedure seem plausible. A first picture is given in Figure 4, showing a histogram of the amortization estimates in the sample, as a percentage of the total regular mortgage payment.

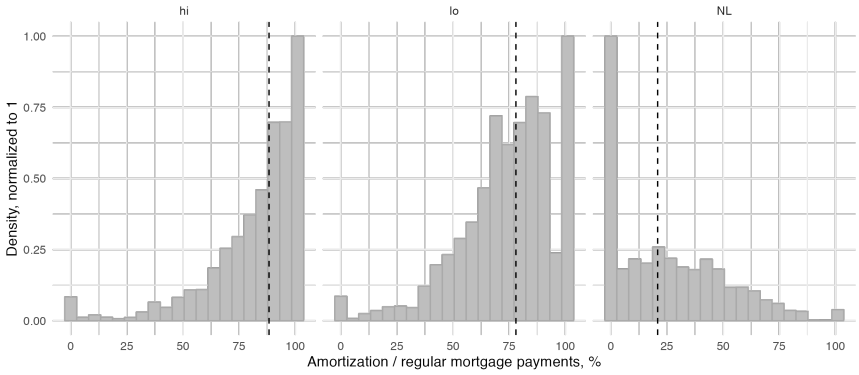

Figure 4: Histogram of the weight of amortization in the regular mortgage payment, HFCS wave 3

Note: dashed lines indicate the group median.

For the vast majority of households in the sampled, between 50 and 90 percent of the mortgage payment goes to debt repayment, reasonable considering the standard loan contracts in euro area countries. The median is about 90% for high-homeownership countries, and close to 80% for the "low" group.

An interesting feature of the observed distributions is a significant bunching at 100%. This largely comes from the most recent loans which, already in the period 2017-8 had very low interest rates (close to zero or in a few cases even negative), in which case almost all of the payment goes to amortization. (Also, implicit interest rates in the sample look in line with the levels observed in past years, and are higher for older mortgage loans, which is consistent with historical trends.) Importantly, the prevalence of non-amortizing mortgages in NL is confirmed in this data. Unlike all other countries, a large portion of households in NL do not make any debt repayment, also according to these constructed amortization estimates.

Further, the weight of amortization payments on household income seems reasonable, in line with other sources and with mortgage market regulations. The obtained values concentrate around

10%-20% of yearly net income, as shown in Figure 5, across all countries – with the notable exception of NL where, as expected, we can observe a mass of households whose regular debt repayment is close to zero.

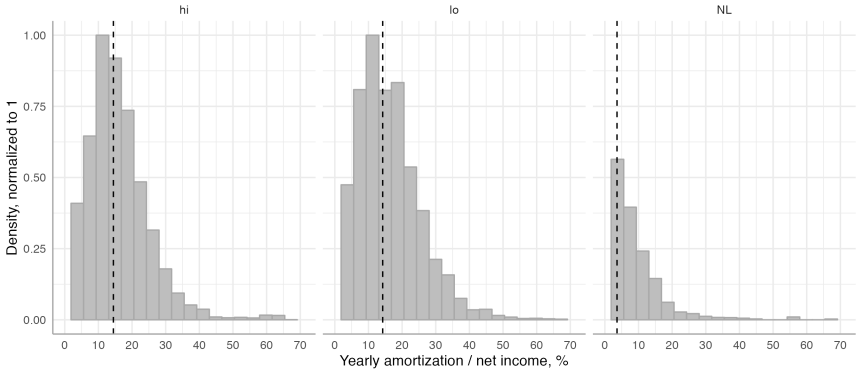

Figure 5: Histogram of the weight of amortization in household net income, HFCS wave 3
Note: dashed lines indicate the group median.

In addition, the obtained amortization values are, at the household level, consistent with the maturity of the corresponding loans. This is illustrated in Figure 6 below, where I compute the ratio between the yearly amortization times the remaining maturity, and the outstanding loan amount. This measure can be interpreted as follows: if the estimated amortization payment remained constant and was made every year until maturity of the loan, how much of the loan would be repaid by maturity. Normally, in most countries, amortization payments increase slightly over time: monthly overall payments, rather than amortization amounts, are fixed in the terms of the loan. Therefore, other things equal, we would expect this measure to be slightly below 100% for the typical household. hou

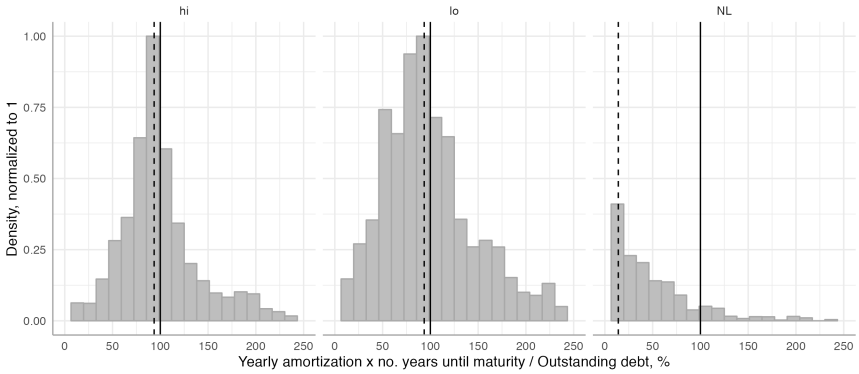

Figure 6: Histogram of the weight of amortization in the regular mortgage payment, HFCS wave 3

Note: dashed lines indicate the group median. The solid line marks 100%.

As Figure 6 shows, this is indeed what I observe for the median household in both "high" and "low" homeownership countries. Again, NL is the notable exception. As a large fraction of

households do not amortize regularly their loans, the median household will still owe almost 100% of the loan at maturity, by this measure.

3.4 Liquidity constrained households in the HFCS

The rich information in the HFCS on households' balance sheets and income allows us to clearly identify liquidity constrained households. I follow the definitions of hand-to-mouth households proposed by Slacalek et al. (2020) (who adapt those introduced by Kaplan and Violante, 2014 to the HFCS data), sorting households as follows:

- **Hand-to-mouth households** verify one of the following two conditions: i. $0 <$ Liquid wealth $\leq$ bi-weekly net income or ii. Liquid wealth $<$ $-$bi-weekly net income. The latter comes from assuming that, for households using short-term personal credit, their liquidity constraint (credit limit) is equal to one month of net income. These households are further sorted into:
  - **Poor hand-to-mouth**: illiquid wealth ≤ 0. Most of these households have zero illiquid assets. (However, a few households with "underwater" mortgages, i.e. the value of their mortgage liabilities exceeds that of housing assets, are also included.)
  - **Wealthy hand-to-mouth:** illiquid wealth > 0. Most of these households own real estate and may have a mortgage loan. (However, a few households with no housing assets and some business wealth or life insurance assets are also included here.)
- **Non hand-to-mouth**

Figure 7 displays the result of this sorting, showing the estimated share of poor and wealthy hand-to-mouth in the population, respectively in the left and right-hand panels, by country group. The colours inside the bars indicate the composition of hand-to-mouth households by their membership to overall (country-level) net income quintiles.

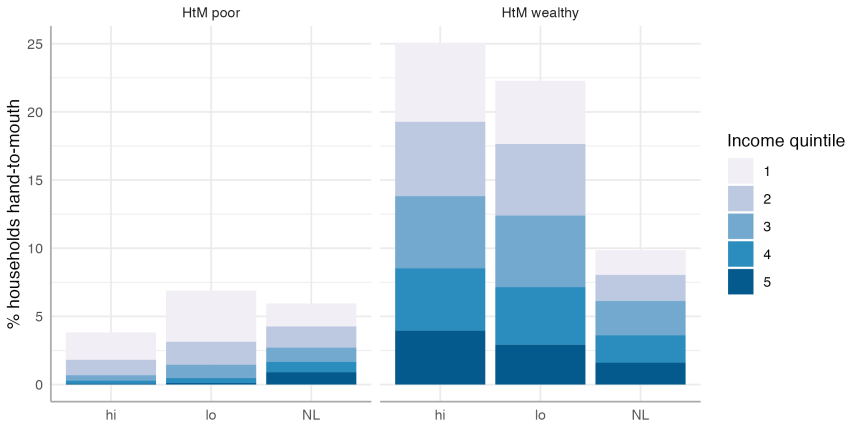

Figure 7: Share of poor and wealthy hand-to-mouth households over the income distribution, HFCS wave 3

As reported in previous studies, the share of liquidity-constrained households in euro area countries is quite high by this measure; around 30% in both high and low homeownership countries. The Netherlands show a striking difference, with a much lower overall share. This is fully due to a much lower share of *wealthy* hand-to-mouth, less than half than observed in other countries, the share of poor hand-to-mouth is on par with other countries (particularly other "low" countries).

Further, there is a clear difference in the income level of households who are liquidity constrained. In other countries, the observed share of liquidity constrained households declines over the income distribution. This is in line with usually observed patterns and standard models: households with an observed high income are less likely to face a situation where liquidity constraints bind. In the Netherlands, there are more income-rich hand-to-mouth households. The difference is particularly stark for poor hand-to-mouth, which are practically non-existent in other countries. Still, also in the case of wealthy hand-to-mouth there is a difference, as in the Netherlands they are roughly uniformly distributed by income, unlike other countries.

These patterns have been little explored in the literature, which has yet to propose an explanation for the stark difference between NL and other countries. As we will see in Section **??**, the specific mortgage institutions in NL could offer one potential cause for this.

4 A simple approach to controlling for the life cycle and other factors when looking at saving rates

My baseline specification follows the approach of Fagereng et al. (2019) which aims to, in a simple way, show the distribution of saving rates over the wealth distribution while controlling for age and income, which also influence saving rates. As I have shown in the preceding section, the saving rates increase strongly with income.

The base consists of adapting the approach to a pseudo-panel setting, using waves 2 and 3 of the HFCS. estimating quantile regressions to obtain estimates of the median indicator – e.g. saving rates – by wealth decile:

$$\theta_i = \sum_{q=1}^{5} \phi_q D_{i,q} + f\left(x_i\right) + \eta_c C_{i,c} + \epsilon_i$$

where for each observation i, θ_i are saving rates or other indicators of interest, $D_{i,d}$ are dummies for membership to net wealth quintile q, φ_d is the corresponding regression coefficient for decile d, x_i is a vector of control variables, $C_{i,c}$ are dummies for country and survey wave and ϵ_i is an error term.

$f(\cdot)$ includes in every case age group, education level (no high school, high school, university) and household total income (in quintiles) indicator variables; in the ensuing exercises may include other variables.

4.1 A first look at saving rates

As a first illustration of the exercise, I run the above regressions for the median saving rate by income and wealth quintiles. Figure 8 shows the main results, with the left panel showing the estimated regression coefficient $\hat{\phi}_q$ for each net income quintile group q, along with 95% confidence bands, and likewise in the right panel for wealth quintiles.

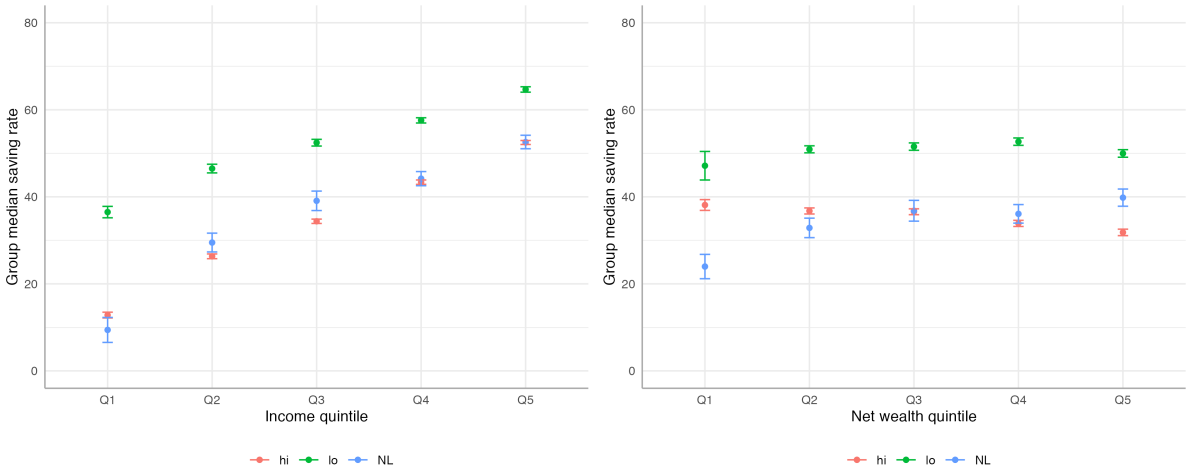

Figure 8: Median saving rates over the income and wealth distributions, with controls

Controlling for age, education and country specificities seems to largely confirm the pattern seen by directly looking at the constructed saving rates, as reported in Figures 2 and 3, i.e. before adding any controls. Saving rates increase over the income distribution, while no systematic differences are seen over the wealth distribution. This is actually in line with recent findings in the literature, such as those reported by Fagereng et al. (2019).

However, a specificity of the case of the Netherlands can be observed at this stage. Unlike the pattern observed in other countries, households at the bottom of the wealth distribution in NL display significantly lower saving rates than the others. The bottom quintile by net wealth is generally, including in the Netherlands, populated mostly by one of two types of households: i. income-poor, typically renter, households; ii. relatively rich (middle or higher income classes) homeowner households with high mortgage debt (usually disproportionately young). This difference could potentially be related to the fact the latter type of households in NL do not have a constraint on their saving patterns imposed by mortgage contracts, allowing them to save less of their income, compared to indebted homeowners in other countries.

5 The heterogeneous role of amortization in saving

The main aim of this paper is to present suggestive evidence that justifies the following postulate: does mortgage amortization, and the institutions that make it a mandatory feature of mortgage

contracts in most countries, affect to a significant extent the distribution of saving (rates), and as such ultimately of wealth? I argue that the key measure to assess this question is the share of household saving flows consumed by mortgage amortization payments. In this subsection, I show that, in my sample from the HFCS, both the patterns observed across euro area countries and the specificities of the case of the Netherlands support such a hypothesis.

For these exercises, I restrict the sample to homeowner households with a mortgage. In the first specification, θ refers to the ratio between mortgage amortization and total household saving (flow). Figure 9 reports the $\hat{\phi}_q$ by income quintile for the usual three country groups.

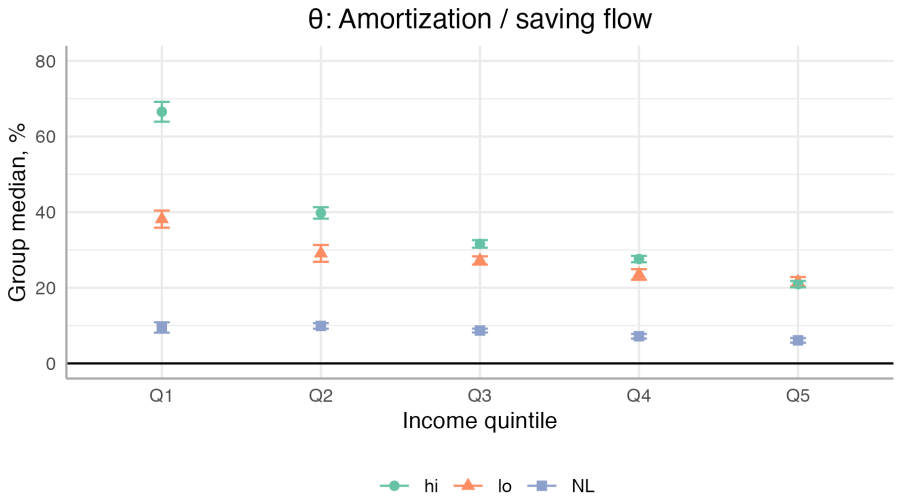

Figure 9: Importance of amortization in household saving flows over the income distribution, with controls

Among both "high" and "low" homeownership countries, the share of saving flows consumed by amortization tends to decline in household income. There is a certain difference between the two country groups. In "high" countries, the share is substantial at the bottom of the income distribution, close to 70%, rapidly declining for income-richer households, reaching about 20% at the top quintile. In "low countries", households at the bottom channel much less of their total saving into amortization, about 40% in total, while the share converges for higher-earning households, such that the difference between the two country groups is almost insignificant from quintile 3 onward.

To interpret this result, recall, from Figure 8 (left panel) that the saving rates of the "low"-country households are substantially higher. In brief, compared to those, the income-poor homeowner households from "high" countries save less and what they do save goes mostly to mortgage amortization. These countries have higher homeownership rates, presumably an indication that for any given household the relative cost of renting vs. buying is higher in these countries. Even admitting that preferences governing the propensity to save are different, one could postulate that these differing patterns might be a result of the effective liquidity constraints imposed by mortgage loans.

The stark difference between the Netherlands and other countries here further bolsters such an

interpretation. It follows from previous discussion that we would expect to see here a much lower average share of saving flows taken by amortization, as many households in the Netherlands do not amortize in this data, and this is confirmed. More importantly, though, we cannot see that the share declines significantly over income quintiles, unlike the pattern in other countries. This might be rationalized by the softer liquidity constraints affecting Dutch households due to their different mortgage institutions. They have a lot of flexibility in deciding whether or how to amortize their mortgage loans, and one implication could be that homeowner households temporarily or permanently enjoying lower income can adjust their saving freely, and not be "forced" to save more than they would optimally do. The observed pattern would be consistent with such a constraining effect of mortgage amortization on household saving.

Check: portfolio share of housing

On the other hand, the picture seen in all the countries except NL might simply be a feature of a well documented feature of household saving: the portfolio concentration of household wealth in household is lower, as households become richer, both along the income and wealth dimensions. There are several reasons for this, both endogenous to wealth accumulation, e.g. fixed costs of participation in certain financial assets, and exogenous, as in higher income households might also be more sophisticated in the way they allocate wealth. (Reasons for this regularity are broadly discussed e.g. in []).

For these reasons, the concentration of saving *flows* in amortization for households at the bottom of the income distribution could just be a byproduct of the same factors driving the generally high concentration of wealth *stocks* in housing. As a first check for this, I run the same median regressions but with the portfolio share of housing assets as the regressor. The results are reported in Figure 10.

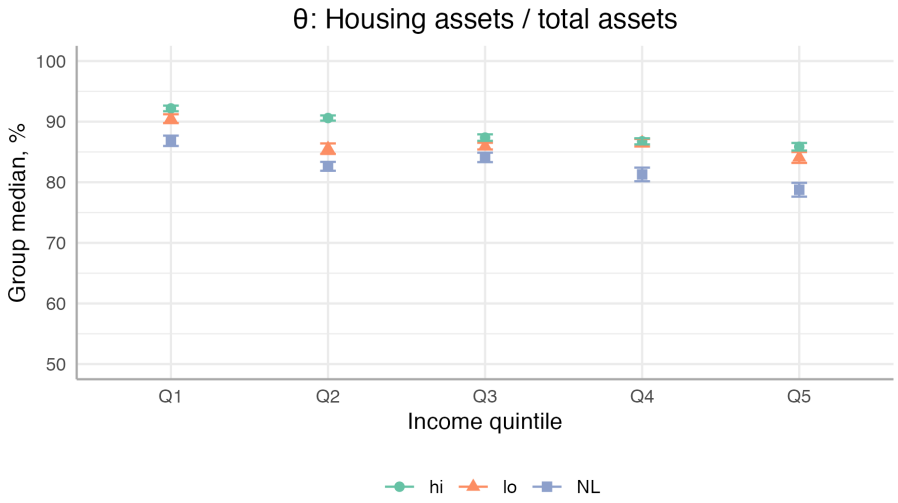

Figure 10: Portfolio share of housing over the income distribution

The strong heterogeneity over the income distribution observed for the concentration of saving *flows* in amortization is not seen in the housing portfolio share. In all countries, including NL, it is quite high (generally north of 80%) and only moderately declining with income (with many differences between quintiles insignificant). This mismatch suggests that the factors driving heterogeneity in the *flows* differ from the *stocks* side and, as such, does not exclude a possibly important role for mortgage design in the former.

"Hand-to-mouth" households

Finally, I run an additional exercise, adjusting the framework such that instead of splitting the sample by income quintile, I split by hand-to-mouth-status, i.e.:

$$\theta_i = \phi^{HtM} D_i^{HtM} + \phi^{NotHtM} D_i^{NotHtM} + f(x_i) + \eta_c C_{i,c} + \epsilon_i$$

The results are reported in Figure 11. Note that, for the purposes of this exercise, I pool together "poor" and "wealthy" hand-to-mouth households. This is necessary due to the fact that in some countries there are few "underwater" households (leaving a very small number of "poor hand-to-mouth" observations in the subsample of mortgaged homeowners used here). A first observation is that here we can more clearly see that, overall, the importance of amortization in saving flows is the highest in "high"-homeownership countries, somewhat lower in "low" countries, and far lower in the Netherlands (as perhaps already suggested by the results in Figure 9).

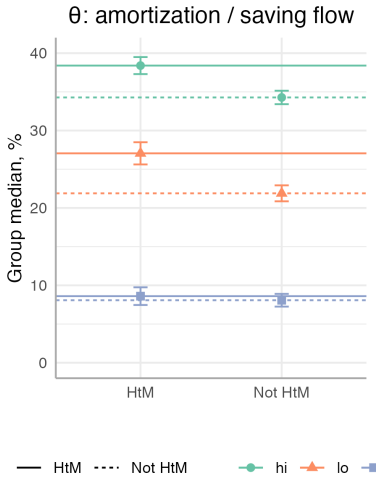

Figure 11: Importance of amortization in saving by hand-to-mouth status

The main message of Figure 11 is made clear by the solid and dashed lines, which allow to compare the coefficients for HtM and non-HtM households, in each country group. In both "high" and "low"-homeownership countries there is a significant difference between liquidity-constrained households, with the median hand-to-mouth household clearly devoting more of its saving to amortization (in both cases a difference of around 5 p.p.). Conversely, in the Netherlands, there is

no significant difference based on hand-to-mouth status.

I interpret these results as a further indication that mortgage design is operating as a relevant constraint on household saving patterns, in particular for households facing negative shocks or permanently low income. In NL, where amortization is largely optional, not only do households overall channel less of their saving into mortgage debt repayment, but there is no difference observed for households hitting their liquidity constraints. Conversely, generally in euro area countries, households against their liquidity constraint are channeling significantly more of their saving into amortization, i.e. into a highly illiquid asset. This further suggests that mortgage contracts lead those households to oversave – it would be optimal to repay less of their mortgage debt, if this were allowed by regulation (and the costs were sufficiently low).

6 Conclusions and future work

[Very preliminary]

Is the effect of constraints imposed by typical mortgage design – a mandatory, fixed amortization schedule – more severe for households at the bottom of the income and wealth distributions? If it is, what does this entail for the observed heterogeneity in saving rates and, ultimately, for the wealth distribution? In this paper, I brought forth evidence suggesting that the effect is more severe, and that they significantly affect the relationship of saving rates with income. To do so, I used data from the HFCS, exploring previously uncovered implications of it for mortgages and housing of households in the euro area, namely regarding mortgage amortization. I showed that saving rate patterns, and the importance of amortization in saving, is significantly different across country groups with different homeownership rates and mortgage types.

Beyond completing the analysis in this paper, the next step in this project is to explore the implications for the wealth distribution in a quantitative model with realistic housing and mortgages - consistent with illiquidity and a preference for homeownership; skewed earnings and financial asset returns consistent with wealth inequality in the data. By allowing households to freely decide how much to repay of their mortgage debt (possibly paying only interest and never amortizing their loan) we eliminate the wedge in saving rates between mortgaged homeowners and other households and assess the impact. By compare this scenario with the status quo, we can try to establish if (and how much) mortgage contract design is an important feature with a causal effect on the observed saving rate and wealth distribution in the data.

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