

Gulbrandsen, Magnus A. H.

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Does high debt make households more vulnerable? A survey of empirical literature using microdata

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MAGNUS A. H.
GULBRANDSEN



NORGES BANK

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Does high debt make households more vulnerable?

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Magnus A. H. Gulbrandsen*

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1 Introduction

Norwegian households' debt, both in absolute and in relative terms (e.g., debt-to-income), has steadily increased since the mid-1990s. In Norway and many other countries, debt-to-income is, therefore, at a historically high level. A prevailing view among macroprudential authorities is that high household debt is a sign of vulnerability not only at the household level but also for the financial system and macroeconomy as a whole (see, for example, Jokipii, Nyffeler and Riederer (2021); European Systemic Risk Board (2018); Norges Bank (2021); Ministry of Finance (2021); Finanstilsynet (2022)). One concern is that high debt will amplify households' consumption response in an economic downturn, thereby deepening a recession. In this article, I provide an overview of research literature that utilizes microdata and microeconometric methods to examine the relationship between household debt and changes in consumption in the event of various economic shocks.¹²

Household debt growth has been high prior to financial crises. The 2007-2009 financial crisis is the most recent and prominent example. In many countries, household debt growth was high in the years leading up to the crisis, followed by a sharp drop in consumption during and after the crisis. Systematic analyses of historical macroeconomic data show that recessions following periods of high debt growth are more profound and longer-lasting (Jordà, Schularick, and Taylor (2013, 2015, 2016)).³ However, these articles do not shed

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¹In this article, by microdata, I mean individual- or household-level data.

²Two other articles that provide an overview of economic research on the relationship between household debt and consumption from a Scandinavian perspective are Fagereng and Halvorsen (2016) and Almenberg, Kilstrøm, Shell, and Vestman (2022).

³See also Anundsen, Gerdrup, Hansen, and Kragh-Sørensen (2016), Thisy, Karabacak and Valev (2010), Mian, Sufi, and Verner (2017), Glick, Lansing, et al. (2010). The analysis by Mian et al. (2017) leads to

much light on the root causes of this stark pattern. One fundamental question that remains, therefore, is whether there is a direct causal relationship between household debt and crises, i.e., whether high debt at the microlevel can lead to more profound or more protracted crises. This question has sparked a large body of literature that uses microdata to reveal causality and mechanisms between debt and consumption at the household level.

One proposed mechanism whereby high household debt becomes a source of macroeconomic instability is that high debt reduces households' opportunities for consumption smoothing. (see, e.g., Farhi and Werning (2016); Corinek and Simsek (2016)). When faced with adverse economic shocks highly indebted households will, therefore, sharply tighten consumption. If many households hold much debt, this could amplify a downturn. It could reduce corporate earnings and their debt-servicing capacity which in turn might result in substantial losses on banks' corporate loans. Banks, as a response, might respond by tightening the credit supply and thereby amplify the downturn.⁴

When describing such a demand channel, policy reports usually focus on adverse shocks to house prices, income, and higher interest rates when describing such a demand channel. Conceptually, these are different shocks, which may stem from various sources. Nonetheless, they can also result from a common underlying cause. Once again, the financial crisis provides a good example. This crisis constituted not only a shock to housing wealth but also to labor income for many households (e.g., unemployment). This feature of economic shocks makes it hard to distinguish the independent effect from each. Nevertheless, it is common to assume that in the face of these shocks, households will tighten consumption more if they have higher debt levels. This article aims to provide the reader with an overview of research that uses microdata to elucidate empirical evidence of this causal relationship at the micro level, and hence, the validity of this claim.

Until the financial crisis, the research literature in macroeconomics focused less on household debt. Furthermore, the norm in empirical studies was to use aggregated time series data and time series econometrics to study macroeconomic outcomes.⁵ However, over the past 10-15 years, the use of microdata and microeconometrics to answer macroeconomic questions has grown vastly. This development results from several factors, one of which is that the volume of available microdata has increased substantially. Arguably the most important reason, however, is the recognition that micro-level inequality is crucial not only to understanding microeconomics but also macroeconomics. The financial crisis and subsequent sharp downturn were influential in this recognition. Heterogeneity in households' portfolios of housing, debt, and other assets, as well as income risk, have proven decisive for understanding the crisis and learning from it (Kaplan and Violante (2018)). Moreover, understanding the mechanisms behind the relationship between debt and consumption adjustment at the micro level can provide valuable insight into how different policy instruments can reduce the risk of future crises. One example is how lending regulations will affect not only households' debt levels, but also their broader balance sheet, and in turn the household

the same general conclusions. However, with one crucial nuance: in economies with a flexible exchange rate, there is no significant relationship between household debt and crises.

⁴Another, more direct mechanism that links high household debt and banks' losses is, of course, defaults. However, since analyses of microdata for Norway show that the proportion of defaults is very small, even in the face of major crises, this article focuses on the mechanism mentioned above (see, e.g., Kragh-Sørensen and Solheim (2014) or Norges Bank (2017)).

⁵The ratio between time series econometrics and microeconometrics in macro journals was 62/38 in 1990 and 35/65 from 2016 to 2018. See Glandon, Kuttner, Mazumder, and Stroup (2022) for a complete analysis of developments in macroeconomics (both thematic and methodological) since 1975.

sector in macro (Almenberg et al. (2022)).

This article is structured as follows. Section 2 examines a selection of articles that examine how households adapted their consumption during and after the financial crisis. Section 3-5 summarizes the literature that investigates how households respond to interest rate fluctuations (Section 3), changes in income (Section 4), and house price inflation (Section 5). Finally, in Section 6, I summarize the key lessons from the literature and raise some questions that need more answers.

2 The financial crisis

Several research articles have studied the causes and consequences of the 2007-2009 financial crisis. In the U.S. and many other countries, the crisis was characterized by rapidly rising household debt growth before the crisis, then falling house prices, higher unemployment and a sharp reduction in consumption. In other words, several shocks with potentially quite heterogeneous effects hit simultaneously. A key question in the literature has been whether, and how, household debt contributed to amplifying the crisis and prolonging the downturn in the years that followed.

The work of Mian and Sufi has been particularly significant in this respect, and very influential in policy circles (Mian, Rao, and Sufi (2013); Mian and Sufi (2014)).⁶ In their articles, they exploit regional variation to analyze the roots and the consequences of the financial crisis. The analyses do not use individual data but regional variation within the U.S. in the analyses. Even so, the articles have been influential in the literature that uses microdata to identify effects.

Mian et al. (2013) examine how the house price shock during the financial crisis affected household consumption and whether the consumption response varied depending on the level of wealth and debt. The analysis uses zip-code-level data on wealth, debt, and consumption and exploit the considerable regional variation in house price falls during the crisis. The article estimates the average marginal propensity to consume (i.e., how many dollars and cents consumption changes with a dollar's fall in housing wealth) at 5 to 7 cents per dollar in changed housing wealth. However, an equally important finding is that there is considerable variation in consumption responses between different regions. Regions with lower average income and higher average loan-to-value (LTV) ratios experienced a sharper fall in consumption. The analysis shows that consumption fell three times more in regions with high average LTV ratios (over 90%) compared with areas with low LTV ratios (below 30%). Mian et al. (2013) suggest that these differences can be explained by the fact that highly leveraged households are close to their borrowing limits, and show that the fall in house prices led to tighter access to credit. Importantly, this effect was more pronounced in low-income areas.

Mian and Sufi (2014) build on the findings of Mian et al. (2013) to investigate whether the fall in house prices also can help explain the sharp rise in unemployment during the financial crisis. Given the findings in the earlier article showing that consumption fell as a result of the fall in house prices, one might expect that unemployment in sectors dependent on local demand (such as service industries and local shops) increases more than in other sectors. Consistent with this, Mian and Sufi (2014) find that unemployment rose more in

⁶The book *House of Debt: How They (and You) Caused the Great Recession and how we can prevent it from happening again* summarizes these findings (Mian and Sufi (2015)).

sectors dependent on local demand and areas with a more significant fall in housing wealth. The estimated effect is substantial: a 10% fall in housing wealth reduced employment in these industries by 3.7 percentage points.⁷

The work of Mian and Sufi and co-authors provide convincing evidence that higher debt provokes a stronger consumer response to macroeconomic downturns and, thus, that high debt can intensify crises. One criticism of the analyses, however, is that the identification strategy does not sufficiently isolate the house price effect from other factors in the labor market that were important during the financial crisis (Davidoff et al. (2016)). Households' response may therefore be the result of other adverse shocks.⁸

With a lower level of aggregation, it is possible to control households' varying exposure to different shocks, thereby isolating the effect of the individual shock. This is one stated motivation in Dynan (2012). Dynan (2012) uses household-level data from the U.S. to test the so-called debt overhang hypothesis.⁹ The hypothesis is that households increased repayments on their loans when house prices fell, thus reducing consumption. The main finding is that households with higher LTV ratios showed a stronger consumption response than those with lower LTV ratios during the financial crisis. One reason could be that they had a target for maximum LTV ratios.

The results in Dynan (2012) underpin the results of Mian et al. (2013) and have been interpreted as evidence that highly indebted households reduced their consumption in order to repay larger parts of their loans. This specific interpretation, however, has been challenged by Andersen, Duus, and Jensen (2016). Using Danish register data, Andersen, Duus, and Jensen (2016) discover, as does Dynan (2012), a strong correlation between households' change in consumption during the financial crisis and the level of their debt before the crisis occurred. However, they also show that highly indebted households had higher consumption (relative to their income) in the years leading up to the crisis. When they include the level of debt and changes in debt in the years immediately preceding the crisis, they find that only changes in debt adversely affect consumption.

In contrast, the level of debt has a positive and significant effect in this study. One interpretation is that highly indebted households did not reduce consumption to increase repayments but normalized consumption patterns. The implication is that the debt level itself was not problematic, but the fact that it financed over-consumption. If so, measures to reduce this type of consumption (and debt) would be more accurate than reducing the level of debt (e.g., mortgages) itself. Svensson's (2021 a,b) results, based on data from the U.K. and the U.S., provide further support for this hypothesis. This interpretation may also be consistent with the findings of Mian et al. (2013) that credit supply fell in lower-income areas. With a tighter credit supply, households that had lived beyond their means supported by easy access to credit could have been forced to cut consumption. The analysis

⁷The crisis hit some industries harder, and areas with higher employment in such sectors will naturally experience a fall in unemployment and house prices. Because this feature challenges the causal interpretation of the estimates, Mian and Sufi (2014) add controls for the sectoral composition of the areas before the crisis. However, these controls do not affect the estimates and support the conclusion that the decline in housing wealth and consumption affected unemployment, not vice versa.

⁸Using the housing supply elasticity as an instrument for house price declines, Mian et al. (2013) argue in favor of isolating the house price effect from other shocks during the financial crisis. In a critique, however, Davidoff et al. (2016) indicate that this instrument is not independent of other labor market conditions that may produce the same results.

⁹The data source in the article is the Survey Panel Study of Income Dynamics (PSID). See <https://psidonline.isr.umich.edu>

of Jensen and Johannesen (2017) also supports this explanation. This article shows that banks with a higher share of loans relative to deposits reduced their credit supply more than other banks during the financial crisis. Banks with a higher deposit-to-loan ratio were thus more exposed to the effects of the financial crisis. The authors show that customers of these banks' borrowed less during the financial crisis than customers of other banks. The same households, in turn, also reduced consumption more than others. Hence, reduced credit supply from exposed banks led to a more significant consumer response among their customers. Finally, the article reveals that customers of exposed banks reduced borrowing and consumption differently depending on their stock of liquid assets.

One drawback of the analyses above is that the financial crisis was complex and that households were differently exposed to various parts of the shock. From these analyses, we cannot know whether households react to the general uncertainty that the crisis contributed to, the fall in house prices, or (prospects of) reduced income. The studies compare consumption before 2007 with consumption in 2009 and then examine whether the debt level prior to the crisis is a factor that contributes to variation in the fall in consumption. This approach makes it more challenging to interpret the results and to make clear policy recommendations. On the other hand, Jensen and Johannesen's approach (2017) takes a step towards isolating the effect of part of the financial crisis shock (i.e., credit tightening) by analyzing random variation in households' exposure through their bank connections. More recently, an increasing number of articles have been published that focus more narrowly on specific shocks, namely unforeseen interest rate changes, income fluctuations, and house price changes, to identify whether highly indebted households react more than other households.

3 The cash-flow effect of interest rate changes

Most households in Norway have floating-rate mortgages. As a result, the pass-through from changes in lending rates to household disposable income is strong in Norway. In contrast, in the U.S., where most mortgages are fixed-rate, the pass-through via this channel is weaker because only new loan contracts are affected. This makes research on the direct effect of interest rate changes on household cash flow particularly relevant for Norway. However, because much macro research originates in the U.S., this channel has received little attention in the literature.

In a standard representative agent model, the interest rate will affect households by changing their incentives to save and consume over time (i.e., intertemporal substitution). All other things being equal, a higher interest rate will make saving for tomorrow more profitable relative to spending today. Over the past decade, however, theoretical and empirical evidence has also highlighted other channels. One channel is indirect via the interest rate's effect on output, employment, and hence households' labor income (Kaplan, Moll, and Violante (2018)). A second channel is direct, where higher interest rates reduce households' disposable income by increasing the interest payments on their floating-rate mortgages. This is referred to as the cash-flow channel, and it will be stronger the more debt a household holds. In addition, characteristics of highly indebted households may correlate with a higher marginal propensity to consume (so-called "hand-to-mouth households"), where a decisive factor is the stock of liquid savings. The total effect of interest rate changes on household consumption will likely reflect a combination of these factors. Moreover, the challenge of analyses examining whether the debt level affects the consumption response lies in isolating

the different mechanisms. More generally, a major difficulty in analyzing the effects of interest rate changes is that the interest rate is endogenous. That is, the interest rate reacts to and affects other macroeconomic variables, simultaneously affecting consumption.

It is also important to keep in mind that, even though interest rate changes directly affect household disposable income at floating interest rates, it is not granted that it will impact consumption. Instead, this will depend on households' total portfolio, (expected) future income growth, and borrowing opportunities. More precisely, in a frictionless market without borrowing limits, forward-looking households with ample access to credit and liquid assets should smooth consumption over temporary interest rate shocks. However, if households have a short-term horizon, have little savings to draw on or are unwilling or unable to weather a temporary interest rate shock, consumption will fall (Almenberg et al. (2022)). Moreover, the drop in consumption will be more significant for households with higher debt.

Two important contributions to uncovering the cash-flow effect with microdata are Di Maggio, Kermani, Keys, Piskorski, Ramcharan, Seru, and Yao (2017) with data from the USA and Flodén, Kilstrom, Sigurdsson, and Vestman (2021) with data from Sweden. First, Di Maggio et al. (2017) look at U.S. households that took out mortgages at a 5-year fixed rate in the years prior to the financial crisis (2005 – 2007). They then examine the consumption effect (in this case, car purchases) of the marked fall in interest expenses for these households when they refinanced at a lower rate at the end of the fixed-rate period (2010–2012). The main finding in the article is that households increased the car purchases by 35 cents for each dollar in reduced interest expenses, but also that they increased their repayments by around 10 cents. Furthermore, they observe that the consumption response is stronger (and the repayment effect weaker) among households with higher debt relative to housing wealth and lower-income households, i.e., households more likely to have taken up loans. This finding is interesting in light of the discussion on whether debt makes households more sensitive to income variations (discussed in more detail in the next section) because it indicates that households that are credit constrained react more strongly than others.

Flodén et al. (2021) examine the effect of monetary policy on household consumption using registry data from Sweden. The authors exploit the differences between households with high and low debt-to-income ratios, floating and fixed interest rates on their loans, and holdings of liquid assets. The article finds that the cash-flow effect is an important transmission mechanism from monetary policy to consumption. Households with more debt reduce their consumption more than households with less debt. They estimate that for every extra dollar paid in interest, consumption is reduced by, on average, 20 to 50 cents. Furthermore, households with adjustable-rate mortgages drive this effect and the consumption response of households with few liquid assets is even more pronounced. Survey evidence from the U.K. and U.S. (Cloyne, Ferreira, and Surico (2020)) and Australia (La Cava, Hughson, and Kaplan (2016)) corroborate these findings.

Holm, Paul, and Tischbirek (2021) provide a recent and important contribution to understanding how monetary policy and interest rates affect consumption at the micro level. They use Norwegian microdata and identify the effect of interest rate changes with monetary policy shocks, i.e., unforeseen changes in interest rates. The article examines the various mechanisms behind households' total consumption response, including the direct cash-flow effect discussed in the works above.

They measure households' net interest rate exposure (the sum of bank deposits less debt) and find that households at the top and bottom of the distribution (i.e., net lenders and net borrowers) change consumption markedly when interest rates change but with the

opposite sign. For those with the highest interest rate exposure, the drop in consumption is almost one-for-one, with their reduced disposable income in the first years after the interest rate hike. This result implies a substantial direct cash-flow effect.¹⁰ A noteworthy finding in this article is that also households that are net lenders respond to the cash-flow effect and increase consumption due to higher interest income. This latter finding contrasts with the theoretical predictions and findings in the articles discussed above, which indicate that the cash-flow effect will be significantly weaker if one has access to liquid assets or credit. Druedahl, Jensen, and Leth-Pedersen (2022) also find that households with little and many savings react to the cash-flow effect of interest rate changes. However, whereas households with savings react when an interest rate change is announced (six months before it enters into force), households with few liquid assets increase consumption only once they receive the extra cash flow. The accumulated consumption response, on the other hand, is comparable for these two different groups.

In sum, the literature discussed in this section shows that higher debt results in a more potent consumption response to interest rate changes via the cash-flow channel. Several articles indicate that liquidity or credit ratings amplify this effect, but households with available liquid assets also appear to react to changes in their cash flow.

4 The marginal propensity to consume

Standard economic theory predicts that a household will only alter consumption moderately during temporary income shocks to smooth consumption over its entire lifecycle. However, empirical estimates using U.S. data and natural experiments show that households undergo a significant change in consumption when they are subject to a one-time change in income (Parker, Souleles, Johnson, and McClelland (2013); Agarwal and Qian (2014)). Furthermore, a common concern among policymakers, however, is that debt may constitute a vulnerability because high debt presumably affects households' marginal propensity to consume in the event of (for example) unemployment.

A prevailing explanation for the existing evidence is that credit constraints and a lack of savings prevent households from adapting optimally and in line with the basic model of consumption. The effect of debt on consumption will then have an impact if households are leveraged up to the maximum borrowing limit or if households with high debt also lack liquid assets. In turn, this prevents them from using credit or savings to smooth consumption in the event of a temporary loss of income. It is a well-established finding in the empirical literature that access to liquid assets affects how sensitive consumption is to income changes (see, e.g., Jappelli and Pistaferri (2014)), as we also saw in some of the studies in the previous section. An empirical question, however, is whether there is an independent, causal effect of debt on consumption response in the event of income changes.

Two articles published in recent years help shed light on this question. Using Norwegian microdata, Fagereng, Holm, and Natvik (2021) investigate which characteristics of households and their finances are decisive for the consumption response after a lottery win. By using lottery winnings as an income shock, the analysis ensures that households cannot adapt in advance and that this one-time income shock does not correlate with other factors that may affect consumption. The study finds that lottery winners, on average, spend about half

¹⁰The article also shows that over time, the direct effect on disposable income and consumption is dominated by the indirect effects of interest rates on earned income via reduced demand.

of their lottery winnings. Accumulated over four years, winners spend nearly 90% of the prize. The key finding in this context, however, is that the estimated consumption response depends on access to liquid assets rather than on the level of debt. Thus, high debt is not a critical factor for the consumption response as long as one has access to liquid assets. However, it is worth noting that in this analysis, the authors look only at absolute debt levels, not debt relative to income or home value. The study says little about whether debt through credit constraint has any effect.¹¹

Baker (2018) provides more precise answers to whether credit constraint is important. This article uses card transaction data linked with employer data and household characteristics to examine how unforeseen changes in income affect consumption. Unlike Fagereng et al. (2021), Baker looks at changes in earned income triggered by company-specific shocks.¹² He then examines whether debt, liquid assets, and access to credit affect the consumption response. A key result from this analysis is that the consumption response is markedly higher for households with high debt, either measured as debt relative to wealth or as a share of income. However, Baker (2018) also shows that these households are credit-constrained and have few liquid assets, which in the end are the key explanatory variables. It is worth pointing out that this does not necessarily contradict the findings of Dynan (2012) and Mian et al. (2013) but it does provide an important nuance: the debt level itself is not crucial for the consumption responses. Instead, it is the fact that high debt levels often coincide with low levels of liquid assets and that one tends to be closer to the borrowing constraint.¹³

To summarize, comparing the results of the cash-flow effect of interest rate changes with income shocks may be helpful. In both cases, liquidity plays a role in the consumption response, while there is a discrepancy as to whether debt levels alone play a role. However, this is not a contradiction, even though both shocks hit household disposable income. Exposure to interest rate changes is a function of debt levels, such that the magnitude of the shock on disposable income varies with debt levels. The literature on income shocks, on the other hand, seeks to observe whether households with different debt levels react differently to shocks of the same magnitude. The main take-away from this section is that the debt levels itself is not a key determinant.

5 Housing wealth and consumption

Numerous studies have attempted to estimate how changes in housing wealth affect consumption. However, because house prices are so closely linked to the macroeconomy, it is particularly challenging to identify house price shocks. In Norway, most households' wealth and debt are linked to housing. This means that a sharp fall in house prices will lead to a large share of wealth falling in value while, at the same time, the mortgage remains constant. Hence, if consumption responds to changes in net wealth, a fall in house prices will lead to a reduction in consumption.

From a theoretical perspective, however, it is not entirely clear that households should change their consumption in response to changes in housing wealth. One perspective is that

¹¹In addition, the lottery winner's age and the prize's size are determining factors.

¹²Examples of company-specific shocks mentioned in the article are surprisingly good or bad performance reports or layoffs.

¹³Kreiner, Dreyer Lassen, and Leth-Petersen (2019) document that households with high debt often have small amounts of liquid assets.

increased housing wealth is not an increase in real wealth because it only reflects higher prices for housing consumption (Campbell and Cocco (2007); Sinai and Souleles (2005); Berger, Guerrieri, Lorenzoni, and Vavra (2018)). In other words, if one tried to extract the house price gains by selling the dwelling, one would also encounter a similarly high price for the dwelling one switched to or higher rental prices for a rented dwelling. Hence, assuming no substitution effects, non-housing consumption should not react to rising and falling house prices. Furthermore, like temporary income shocks, households with a long-term perspective will smooth temporary fluctuations in house prices throughout their lifecycle. If so, consumption today should not change much. In addition to (or alternatively) this wealth effect, however, there could also be a separate effect from housing being a form of collateral that provides access to credit. Households that are close to the borrowing limit, house price inflation that changes their dwellings' collateral value and thereby eases credit constraints, will have gained access to credit to finance consumption. This effect is thus closely linked to the level of households' LTV.

Campbell and Cocco (2007) and Disney, Gathergood, and Henley (2010) use data from a U.K. survey to estimate the effect of house prices on consumption. Campbell and Cocco (2007) exploit regional variations in house price changes. Compared with other studies, Campbell and Cocco (2007) find a relatively strong effect of changes in house prices on consumption, and this effect is more significant for older homeowners than young homeowners.¹⁴ One explanation for these differences is that older people expect to trade down to a smaller home, while younger people usually want to buy larger homes. The wealth effect will therefore be more potent because they can expect to cash in on the increased house value in the near future. Disney et al. (2010) focus on unexpected changes in house prices and come to different conclusions, even with similar data. They find a significantly lower consumption response and no difference between older and younger people. Because this empirical strategy takes into account that other macroeconomic variables tend to co-move with house price changes, this article arguably shows a more well-identified housing price effect.

In Browning, Gørtz, and Leth-Petersen (2013), the motivation is to uncover which mechanisms cause changes in consumption when housing wealth changes unexpectedly. If there is a housing wealth effect, a rational, forward-looking household should react only to news regarding the property value, as in Disney et al. (2010). On the other hand, if the collateral value of the dwelling is the driving force, households that are initially close to the borrowing limit should react more than other households. Browning et al. (2013) use Danish microdata and distinguish between young and old households, owners and tenants, and between households that are more or less likely to be credit constrained. In summary, the study finds little evidence in favor of a wealth effect but instead clear evidence of a collateral-value effect. As expected from this mechanism, young homeowners with few liquid assets responded positively to house price growth after introducing a reform that permitted housing as collateral for consumer loans. Aladangady (2017) comes to a similar conclusion. By exploiting regional heterogeneity in housing markets in the United States, he estimates that for every dollar increase in home value, households increase consumption by five cents. Moreover, the analysis shows that the effect is considerably higher among households with a higher debt-servicing ratio (13 cents to the dollar). Other studies focusing on the effect of house prices on borrowing also support this correlation (Cloyne, Huber, Ilzetzi, and Kleven (2019); Andersen

¹⁴See Appendix F, Table 20 in Kessle, Tyrefors, and Vestman (2019), which provides an overview of empirical estimates in the literature.

and Leth-Petersen (2021) and DeFusco (2018). Cloyne et al. (2019) studied the effect of house prices on household borrowing and found that higher rates result in higher borrowing levels. Andersen and Leth-Petersen (2021) find similar results, showing that the effect is most significant among young people, with a high loan-to-value ratio. DeFusco (2018) isolates the wealth effect from the credit constraint effect by looking at the effects of a reform that made it possible to predict a future housing price increase. The results indicate that borrowing increased considerably more among households closer to the borrowing limit than other households when the value of their house increased.

Finally, Kessel et al. (2019) use a natural experiment that changes house prices in a geographically concentrated area surrounding an airport. The researchers exploit a sharp fall in house prices in this area triggered by an unexpected decision to continue airport operations. The advantage of this strategy is that the fall in house prices is independent of other macroeconomic conditions, making it easier to link the fall in consumption to changes in the value of the dwelling. The results show small and not statistically significant effects on most consumption categories. Households that buy new cars are an exception, that is, conditional on buying a new car the new car's value was lower due to the drop in house prices. However, compared to Mian et al. (2013), who also looked at the effect on car purchases, they find a markedly lower effect. Kessel et al. (2019) also find that the effect is concentrated among households with a high LTV ratio. This finding points to credit constraint and collateral value as the most important mechanisms.

Overall, the results vary concerning the degree to which households' consumption responds to changes in house prices. The wealth effect, in particular, is uncertain. However, several studies indicate that the change in collateral value due to changes in house prices do affect the consumption response.

6 Summary

In this paper, I have summarized a large and growing body of literature that analyze microdata at the household level to elucidate whether high debt makes household consumption more vulnerable to changes in (or shocks to) interest rates, income and house prices. The backdrop is that history has shown that downturns are more pronounced and more prolonged if preceded by high household debt growth. Thus, a concern among macroprudential authorities is that debt may entail a macroeconomic vulnerability via the demand channel. In line with the trend in international economic research, I have focused on literature that attempts to illuminate causal relationships using microdata. In order to adopt appropriate policy measures, policymakers and regulators should strive to understand the mechanisms behind these relationships, not take them as given.

I draw the following lessons from the literature. First, in the face of the financial crisis, high-debt households reduced consumption more than low-debt households. However, there is a debate as to whether this is because households tightened consumption in order to reduce their debt level, whether there was a negative effect via housing wealth or whether it was due to a correction in consumption, which prior to the crisis was artificially high and financed by borrowing. If the latter is the case, consumption growth may be just as important an indicator as debt growth for monitoring household vulnerabilities. Second, the direct mechanical cash-flow effect on consumption via higher interest expenses is more pronounced for households with higher debt. Higher debt and a floating interest rate will

thus make household consumption more sensitive to interest rate changes. We should note that this will not only make households more vulnerable when interest rates increase. It also entails that expansionary monetary policy can be more effective in times of crisis. Third, a finding in the literature is that households with higher debt appear to have a higher marginal propensity to consume in the face of transitory income shocks. However, if one delves deeper into the mechanisms, the literature tells us that liquid assets and access to credit are the key determinants. When controlling for these effects, there is no independent effect of debt levels on marginal propensity to consume in the event of income shocks. Finally, there are divergent results concerning the effect of changes in housing wealth on household consumption. A robust finding, however, is that shocks to housing wealth will affect highly indebted households via the collateral value of the dwelling and thereby access to credit to finance consumption.

The literature covered here has been intended as an introduction and is not exhaustive. The articles were selected because they represent where the research literature stands today. The amount of research in this field is also increasing rapidly, indicating that several questions still need to be answered and mechanisms still need to be better understood. It seems reasonable to assume that institutional context will influence household borrowing and consumption adjustment. Therefore, a natural question is whether the findings in the individual studies also apply to other contexts (i.e., external validity). One of the strengths of the macro studies cited in the introduction is that they analyze aggregated data from several countries over a long historical period. Few studies exist today that proceed in the same manner with microdata. A significant contribution to this literature in the future would therefore be to obtain and analyze microdata across national borders to investigate the external validity of the findings in the existing literature.

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