Staff memo

Home equity extraction activities in Sweden

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SVERIGES RIKSBANK

A staff memo provides members of the Riksbank's staff with the opportunity to publish slightly longer, advanced analyses of relevant issues. It is a publication by staff members that is free of policy conclusions and individual standpoints on current policy issues, yet it is approved by the appropriate head of department. This memo has been produced by staff at the Riksbank's Financial Stability Department and the Research Division.

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Summary

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Households obtain mortgages primarily to finance the purchase of a home. Yet existing homeowners can pledge the same home as collateral to obtain additional credit if the loan-to-value (LTV) constraint doesn't bind, especially when it has appreciated in value or when the household has amortized its previous mortgage loan. Such borrowing reduces home equity (the difference between the value of the home and outstanding mortgage debt), and the additional mortgage loan not used for home purchases is called home equity extraction.

Home equity extraction is the second largest contribution (about SEK 330 billion) to the increase in the mortgage stock for Swedish households.[2] This staff memo investigates how many households extract home equity, how much they extract, what the characteristics of these households are, and the consequences of home equity extraction for household indebtedness.

We find that one-third of mortgage borrowers in Sweden have extracted home equity at least once during the period 2010 – 2017. On average, these borrowers increased their mortgage debt by SEK 300,000 (or 20 per cent) per extraction. Middle-aged households with relatively high incomes and high levels of debt extract more home equity. Home equity extractors often reside in areas with high housing price growth.

Home equity extraction may increase the vulnerability of households as it increases their indebtedness level. We document that the average debt-to-income (DTI) ratios increased by 50-70 percentage points after extracting home equity. Due to data limitations, we don't know the main purpose of home equity extraction. A small share (20 per cent) of households repaid their consumption loans immediately after extracting home equity. This implies that using cheaper mortgage credit to substitute more expensive consumption loans can be one purpose of home equity extraction. However, even for those 20 per cent of households, the extracted amounts are much larger than the consumption loan repayments. Nearly 80 per cent of households didn't use home equity for consumption loan repayment.

Given that home equity extraction leads to higher household indebtedness in Sweden, It is important to monitor how home equity extraction activities develop in the future.

[1] We would also like to thank colleagues at the Riksbank for useful input. The opinions expressed in this document are those of the authors and are not necessarily shared by the Riksbank.
[2] See Emanuelsson, R., Katinic, G. and Spector, E. (2018), Developments in the housing market and their contribution to household debt. Economic Commentaries No. 14, 2018

Introduction

Housing is the largest component of household wealth for most households. When purchasing a home, the household can pledge it as collateral with banks and mortgage lenders to obtain credit. In Sweden, households can finance up to 85% of the value of their home with mortgage loans. The remaining amount, the required down-payment of at least 15%, is called home equity. Home equity is the net wealth position (assets minus liabilities, or equivalently the current home value minus mortgage debt outstanding) of the household in their home.

Over time, the amount of home equity can change. For instance, home equity increases if the household repays or amortizes its mortgage loan, or if housing prices increase. Households then have the opportunity to take out a part of their home equity as cash. There are two possible ways to tap into home equity. First, the household can sell the home and cash out the home equity. Second, the household can lever up, increase its mortgage loan to at most 85% of the (possibly higher) home value, and use the additional mortgage for consumption and investment. The second version, usually termed home equity withdrawal or home equity extraction,[3] is the most popular approach to tap into home equity in many countries. It enables homeowners to tap into home equity without needing to buy and sell their property, which involves both high transaction costs and uncertainty in prices on the market.

Home equity extraction can take different forms in practice. In some countries, the bank issues a separate home equity loan to the homeowner. For example, in the United States, the most popular way is through a home equity line of credit (HELOC). Such loans are comparable to a credit card or a collateralized consumption loan, which is flexible and liquid. In Sweden, the common way of home equity extraction is to increase the existing mortgage amount against an updated valuation of the house if the loan-to-value (LTV) ratio is lower than 85%. The additional mortgage loan will then be added to the borrowers' transaction account.

Here is a simple example of home equity extraction. Take a household that bought an apartment in Stockholm for SEK 3,500,000 at the end of 2013, borrowing up to the LTV limit of 85 per cent. Its mortgage balance therefore is SEK 2,975,000. In the following years, housing prices increased sharply. At the end of 2016, the same apartment was valued at around SEK 5,000,000.[4] If the household did not amortize during this period, it can extract an amount of SEK 5,000,000*85%-2,975,000 = 1,275,000. If the household did amortize over the years, it can extract even more home equity including the amortization payments, as the existing mortgage is less than the initial mortgage.

Home equity extraction can help liquidity-constrained households to smooth consumption (e.g. Hurst and Stafford, 2004) or credit-constrained households to finance their own business (Corradin and Popov, 2015). However, it can also have a negative impact on the economy and financial stability. The origin of the global financial crisis of 2007-09 is attributed to the increase in household indebtedness during the housing boom period of the mid-2000s and the subsequent defaults when housing prices dropped sharply afterwards in the US. According to Mian and Sufi (2011), home equity-based loans accounted for USD 1.25 trillion (or 20%) of the rise in household debt from 2002 to 2008, and at least 39 per cent of total new defaults during the global financial crisis in the US. Other studies such as Kumar (2018) and Laufer (2018) also point out the relationship between household over-indebtedness due to home equity withdrawals and the increase of mortgage defaults. The strong growth in Swedish housing prices makes a detailed study on equity extraction activities in Sweden therefore particularly

[3] It can also be called mortgage equity withdrawal. In this staff memo, we use "extraction" and "withdrawal" interchangeably.
[4] According to Valueguard, the housing price index for apartments in Stockholm has increased by 42 per cent from December 2013 to December 2016. https://www.valueguard.se/beskrivning

relevant. Emanuelsson et al. (2018) show that home equity extraction is the second largest driver of the increase of household debt in Sweden. However, that study focused on changes in the stock of household debt, and did not study the distribution of home equity extraction across the population. In this study, we complement the work of Emanuelsson et al. (2018) by providing evidence of home equity extraction using household-level panel data between 2010 and 2017. Previous studies done by the Riksbank use the same data to study household indebtedness (see for instance Ölcer and Winstrand (2014) and Blom and van Santen (2017)). The data includes monthly balances of mortgage and unsecured debt[5] for households that borrow from the eight largest credit institutions in Sweden, as well as information on borrower characteristics such as income, age and location. This data allows us to identify the households extracting home equity, and study how many households extract home equity, the extracted amount, and the types of households doing so. We also study how households' debt-to-income (DTI) ratio changes when extracting home equity, and whether home equity withdrawals are followed by a repayment of unsecured debt.

In the remaining parts of the staff memo, we will first present statistics on home equity extraction activities in Sweden, and then show the distribution across different household groups. Afterwards, we will discuss the consequences of home equity extraction for household indebtedness and the purposes of home equity extraction.

We find that one-third of mortgage borrowers in Sweden have extracted home equity at least once during the period 2010 – 2017, with an average amount of around SEK 300,000 per extraction, which is equivalent to a 20 per cent increase in their mortgage debt. Middle-aged households with relatively high incomes and high levels of debt extract more home equity. Home equity extraction raises the DTI ratio of households by 50-70 percentage points, which may increase their vulnerability should economic conditions deteriorate. Though the main purpose of home equity extraction is still unknown, we show evidence that 20 per cent of home equity extractors may have used extracted home equity to repay more expensive consumption loans.

Identify home equity extraction activities

Throughout, we use the following definition of home equity extraction. First, the household needs to increase its outstanding mortgage balance by at least SEK 50,000 in a given month.[6] We exclude low amounts as equity extraction usually entails some transaction costs for the borrowers, and small amounts of mortgage increases are therefore unlikely due to equity extraction. Second, the household should be stable, in the sense that we observe the household for a 13-month rolling period with the same household composition. Third, there should be no missing information on key variables such as debt, income, age or region in this period. Fourth, the household should not change address, as this might reflect the household's purchase of a new property rather than extracted equity. Fifth, the household should not change the type of property it lives in (tenant-owned apartment or single-family house) nor increase the number of owned properties, again to rule out purchases. The appendix provides more detailed descriptions of the processing of the data as well as the definition of home equity extraction events.

Note that we do not observe the purpose of a loan that appears in the data, nor are home equity loans separately labelled as such. Therefore, we rely on the above definition to identify equity withdrawals to the extent possible. There will be instances where the definition does not hold and households are falsely identified as withdrawing equity, for instance when households purchase additional property abroad using their Swedish home as collateral. On the other hand, some households that do withdraw equity will not be classified as such, in particular, those households that

[5] Unsecured debt refers to credit to households that is not backed by collateral. In our data, there are three types of unsecured debt: credit card debt, instalment loans, and consumption loans.

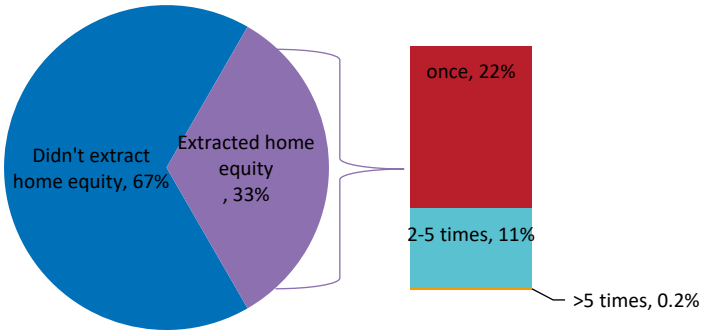
[6] In general, we find that the correlations and time patterns are robust to changing the threshold to either SEK 20,000 or SEK 100,000.

had a debt-free property and decide to borrow against it, or those households that sell and buy properties and take out part of their increased home equity as cash (i.e. not reinvest its entire home equity). However, these misclassifications are unlikely to affect the main results.

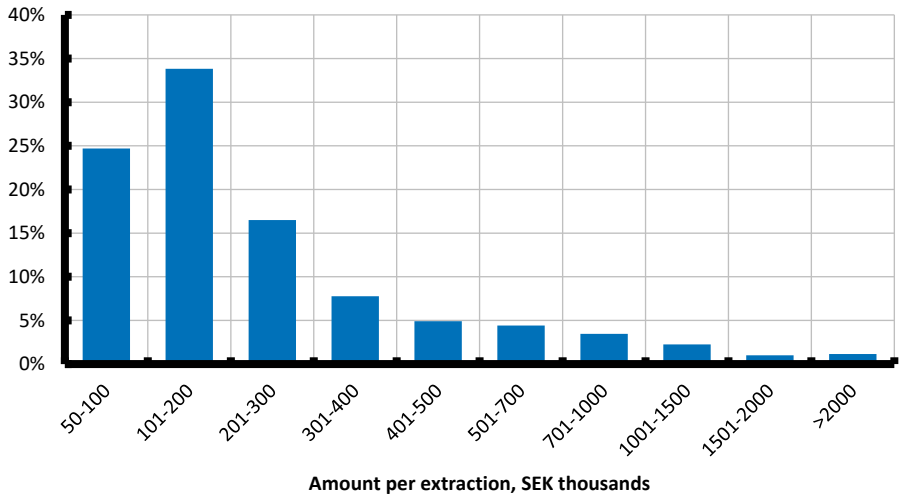
Overview of home equity extraction activities

We start the results section by looking at the frequency with which Swedish households have extracted equity from their home in the period 2010 - 2017. Figure 1a divides the 2,595,411 uniquely identified households in the data according to whether and how many times they extracted equity. It appears that one-third of mortgage borrowers in Sweden (866,075 households) extracted home equity during the sample period. The majority (two-thirds) of the home equity extractors withdrew only once during the same period, whereas one-third extracted equity more than once during these years. Less than 1 per cent of households extracted home equity more than 5 times. Of the total 1,294,016 home equity extractions during the period 2010-2017, 12 per cent were larger than SEK 0.5 million, and 4 per cent were larger than SEK 1 million (Figure 1b).

Figure 1. Percentage of households that extracted home equity during the period 2010-2017
a. Percentage of households by frequency of home equity extraction



b. Percentage of home equity extractions by amount per extraction

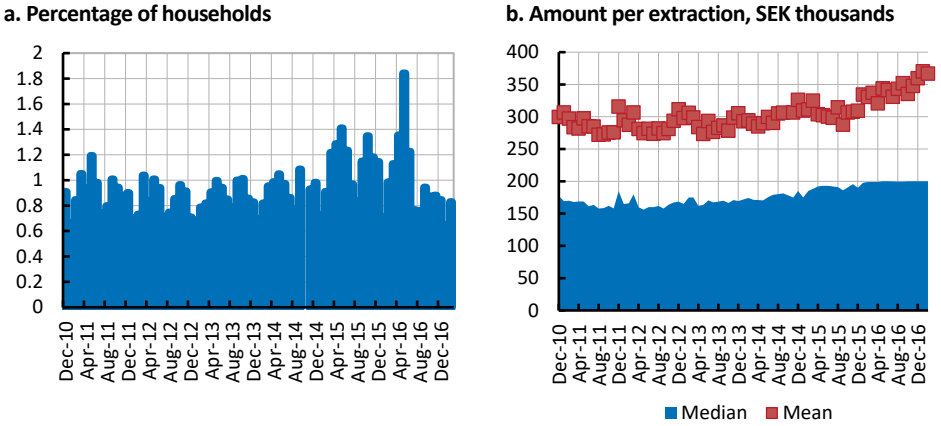


Source: Sveriges Riksbank

Overall, the home equity extraction events are distributed evenly over time (Figure 2a). The percentage of households that extracted home equity in a given month is around 1 per cent (around 26,000 households) during most months. The exception is the period of March 2015-June 2016, during which the percentage increased sharply by around 0.4 percentage points (40 per cent increase over the average level) and reached a peak of 1.8 per cent of households withdrawing equity in May 2016. This might reflect the reaction of households to the first amortization requirement. The Swedish Financial Supervisory Authority (Finansinspektionen) announced this requirement in March 2015, and it came into force in June 2016.[7] After the introduction of the amortization requirement, extracting home equity through mortgage refinancing has become less attractive as the renewed mortgage contract is now considered as a new mortgage loan and is required to be amortized afterwards. In addition, the amortization requirement limits the frequency of housing revaluations to once per 5 years. After June 2016, the frequency of equity withdrawals falls back to somewhat lower levels, consistent with the findings of Aranki and Larsson (2019). The coinciding timing of the implementation of the amortization requirement and a sharp increase before plus decline thereafter is suggestive, but not proof, of a link between the amortization requirement and the incidence of equity withdrawals. Van Santen (2017) also discussed how the amortization requirement might have affected the growth rate in unsecured loans: the rise in consumption loans after June 2016 might therefore be explained by a shift away from equity withdrawals to unsecured loans.

Figure 2b shows that the average amount of home equity per extraction is around SEK 300,000 from December 2010 to December 2015. It trends up quickly to SEK 370,000 during 2016-2017, which is equivalent to the median annual income of Swedish homeowners.

Figure 2. Percentage of households that extracted home equity and the extracted amount over time



Note. Due to data errors, we omit October 2014 from the charts. See the appendix for further details on the data processing.

Source: Sveriges Riksbank

Characteristics of home equity extractors

Home equity extractors have higher incomes

We first categorize all households into four groups according to whether and how frequent the household extracted home equity during 2010-2017: (1) didn't extracted home equity, (2) extracted

[7] The first amortization requirement that new mortgage holders must pay their mortgages down to a 50 per cent LTV ratio applies to all new mortgage loans starting on 1 June 2016. Exceptions are present for home equity loans, which can be repaid linearly in 10 years as an alternative rule.

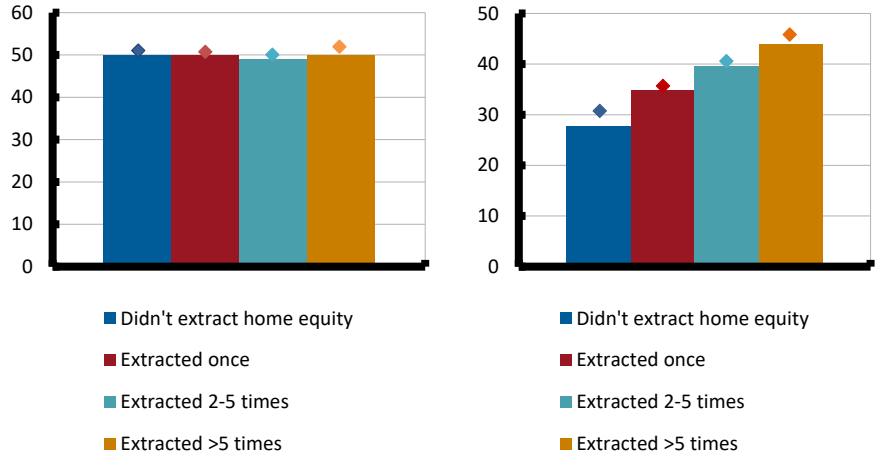
only once, (3) extracted 2-5 times, (4) extracted more than 5 times. Then, we compare the characteristics of households among those four groups. As shown by Figure 3a, the average age of the four household groups is almost the same and around 50 in the month of January 2017. However, the average monthly income during the period 2010-2017 varies across the four groups. Home equity extractors have higher incomes than non-extracting households. Among the extractors, those who have higher incomes extracted more frequently. This is not a surprise, as higher income provides larger debt capacity.

Figure 3. Age and average income by household type

a. Age, in January 2017

b. Average monthly income 2010-2017

SEK thousands



Note. The bars denote the median, while the diamonds denote the mean. Figure 3a shows the age by household type in January 2017. Figure 3b shows the average monthly income across the period 2010-2017 by household type.

Source: Sveriges Riksbank

Middle-aged, higher income or more highly indebted households extract more home equity

Figure 4 presents average extracted amounts of home equity by age (Figure 4a), income (Figure 4b), and DTI ratio (Figure 4c) of the borrowers that extracted home equity. We compute age, income and DTI in the month before extracting home equity. The blue line shows the (conditional) averages taken over the years 2010-2014, and the red line the same statistics for the years 2015-2017. Generally, the extracted amount is larger for the later period of 2015-2017, compared with that for the earlier period of 2010-2014, in spite of categorizing by age, income or DTI ratio of the borrowers. This is in line with the trend of extracted amount of home equity shown in Figure 2b.

The extracted amount of home equity varies across household groups. As shown in Figure 4a, the extracted amount and age demonstrate an inverted U-shaped relationship. Middle-aged households between 35 and 65 extracted SEK 50,000 more home equity compared to younger and older households. All households across different age groups increased the extracted amount after 2015, while the increment is 2-3 times larger for middle-aged households compared with that for younger and older households.

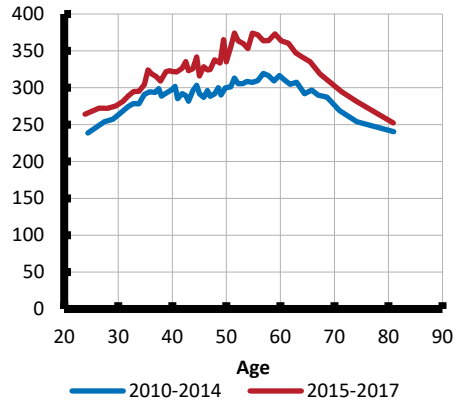
Figure 4b shows the distribution of the extracted amount by household income. In general, households with higher monthly after-tax incomes extract larger amounts of home equity. Especially for higher-income households with monthly after-tax incomes larger than SEK 50,000, the extracted amount increases substantially with the income level of the household. A household with SEK 80,000

after-tax income extracts SEK 600,000 home equity, which is almost double the extracted amount for the household with SEK 50,000 after-tax income. On the other hand, the difference in the extracted amount among lower-income households is relatively marginal.

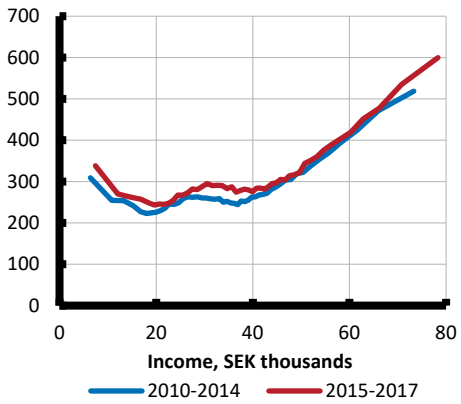
Figure 4c shows the relationship between the extracted amount and household indebtedness. Households with higher DTI ratio extracted more home equity. The positive relationship is much stronger for households with DTI ratios larger than 500 per cent. The curve for the later period of 2015-2017 demonstrates a parallel trend with that for the earlier period of 2010-2014. This pattern suggests that the increase in extracted amounts after 2015 is not driven by households with certain DTI levels, but rather reflects an upward shift across the entire DTI distribution.

Figure 4. Extracted amount of home equity per household by age, income and debt-to-income ratio in the month before extracting home equity

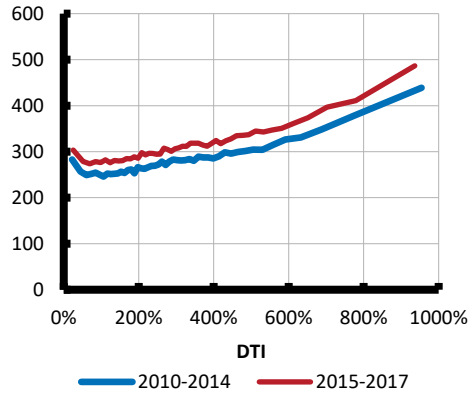
a. by age, SEK thousands



b. by income, SEK thousands



c. by debt-to-income ratio, SEK thousands



Source: Sveriges Riksbank

The extracted amount is larger in municipalities with larger home value increases

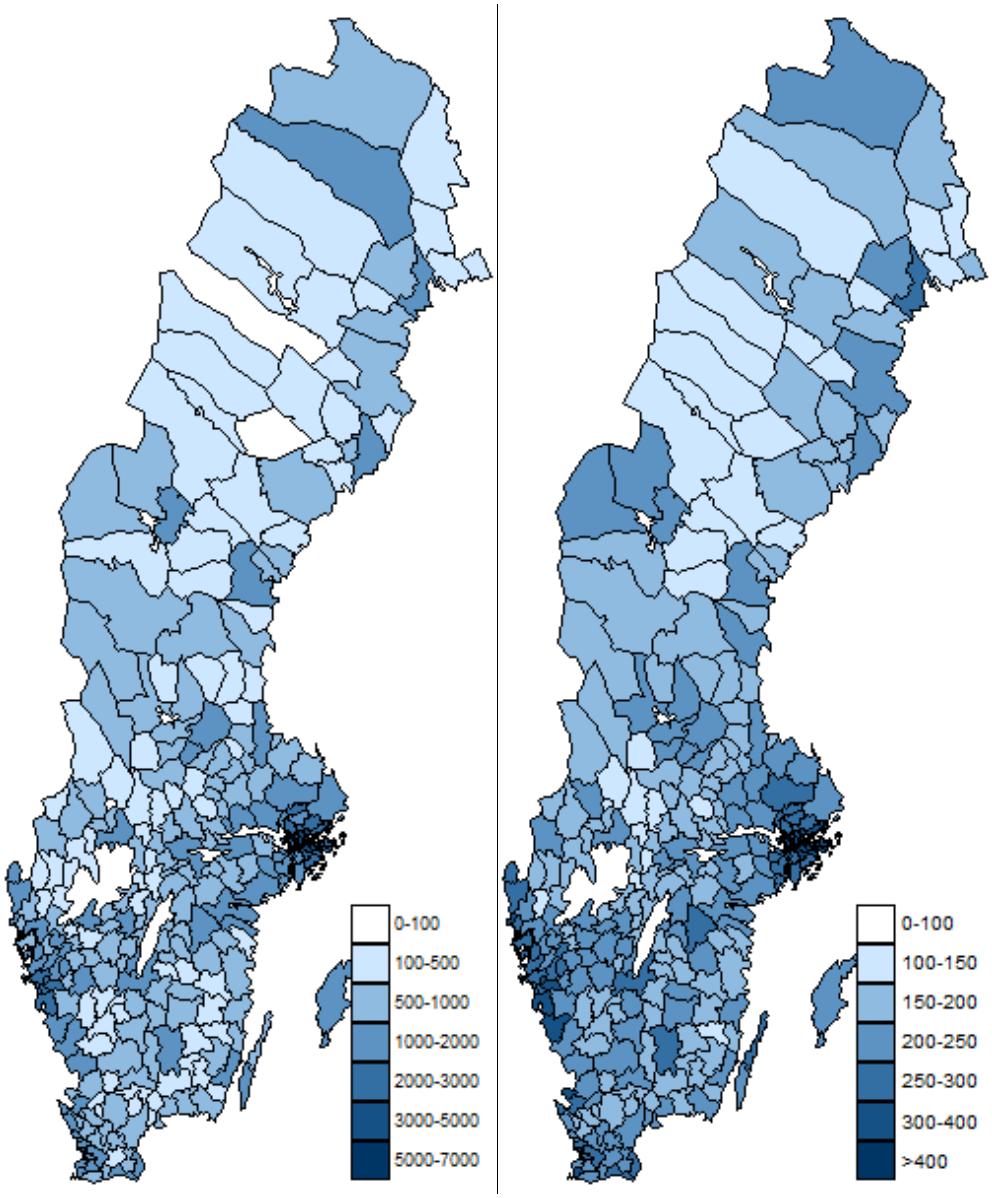
As home equity is the difference between the market home value and the mortgage outstanding, a greater house price increase can generate a larger amount of home equity available for households to extract. Figure 5 presents the geographical distribution of the extracted amount of home equity per household in 2010-2017, as well as the municipal housing price increase during the period of 2007-2017 for comparison. The corresponding period for the map on the left starts three years earlier as it

usually takes several years to accumulate enough home equity. As expected, the two maps in Figure 5 demonstrate similar patterns. Households that reside in municipalities with greater housing price increases extracted more home equity.

Figure 5. Geographical distribution of home equity extraction

a. House price increase, 2007-2017
SEK thousands

b. Extracted amount per household, 2010-2017
SEK thousands



Note. The map on the left shows the housing price increase (in SEK thousands) during the period of 2007-2017, by municipality. The map on the right shows the median extracted amount of home equity per household (in SEK thousands) during the period of 2010-2017.
Sources: Statistics Sweden and Sveriges Riksbank

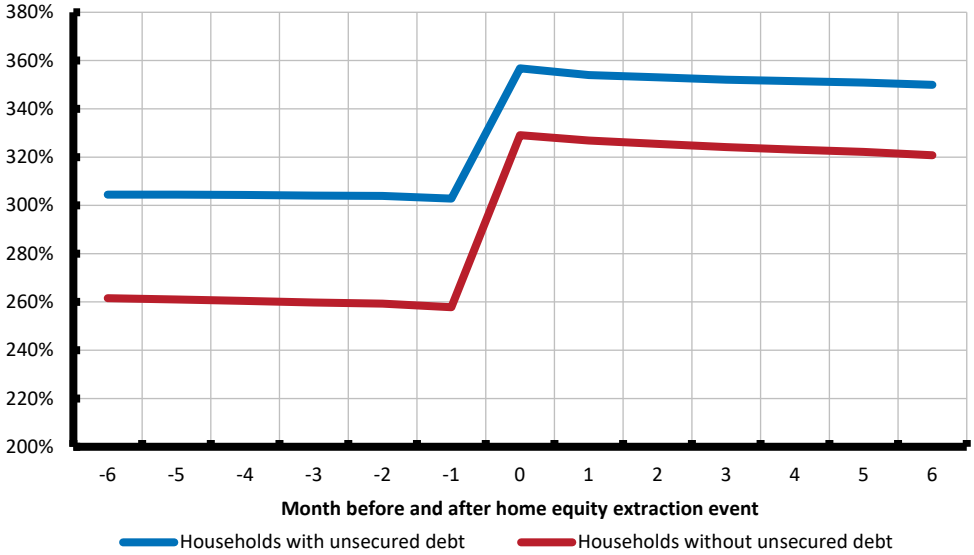
Consequences of home equity extraction for household indebtedness

Household indebtedness increases after home equity extraction

As extracting home equity increases the outstanding mortgage debt, it will naturally lead to higher levels of household indebtedness. Therefore, the household DTI ratio should rise unless the income changes at the same time. However, the DTI ratio could in principle be constant if home equity extraction is used fully to repay other forms of household debt, for instance a consumption loan.[8] As shown in Van Santen (2017), consumption loans are becoming an important component of household debt in Sweden. It is plausible that a certain percentage of home equity extraction is used for repaying other more expensive consumer debts.

Figure 6 shows the median DTI ratios for home equity extractors, in a window of 6 months around the time the household extracts home equity, which we refer to as the event window. Month 0 denotes the month during which the household extracted home equity, month -1 denotes the month prior to and month 1 the month after extraction. The blue line depicts median debt ratios for households with outstanding unsecured debt (the sum of credit card debt, instalment loans and consumption loans) prior to extracting equity. The red line shows median DTI ratios for households without unsecured debt. The two groups had different DTI ratios prior to extracting home equity.
Importantly, for both groups, the DTI ratio jumps up at time zero. Hence, DTI ratios have increased substantially after extracting home equity. For extractors without unsecured debt, the median DTI ratio jumps from 260 per cent to 330 per cent (an increase of 27 per cent) within a month of the extraction event and then stays stable at that higher level over the following 6 months. For extractors with unsecured debt, the increment of the DTI ratio is around 55 percentage points (an increase of 18 per cent from 300 per cent to 355 per cent), which is smaller than for the extractors without unsecured debt.

Figure 6. Debt-to-income ratio before and after home equity extraction



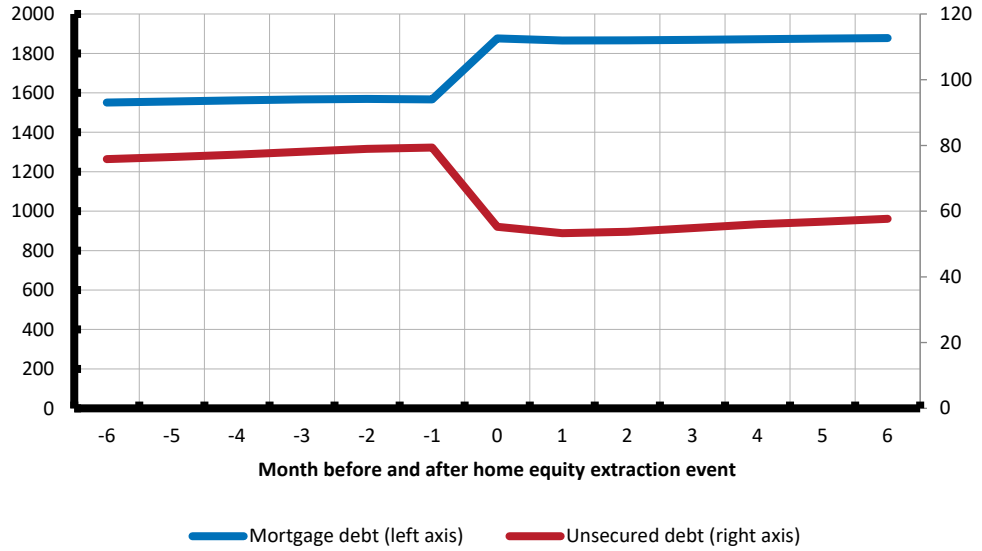
Note. The figure shows median debt-to-income ratios for home equity extractors with and without unsecured debt around the time of equity extraction.
Source: Sveriges Riksbank

[8] Consumption loans are loans to households without collateral. It is one type of unsecured debt to households.

For extractors with unsecured debt, the increase in mortgage debt is partly offset by the decrease in unsecured debt

As shown by Figure 7, a decrease in unsecured debt may explain this comparatively small increase in the DTI ratio for extractors with outstanding unsecured debt. The average unsecured debt outstanding decreased from SEK 79,000 to SEK 55,000 (30 per cent decrease) in the month of home equity extraction and remains almost unchanged in the six months after the extraction.

Figure 7. Mortgage and unsecured debt before and after home equity extraction
SEK thousands



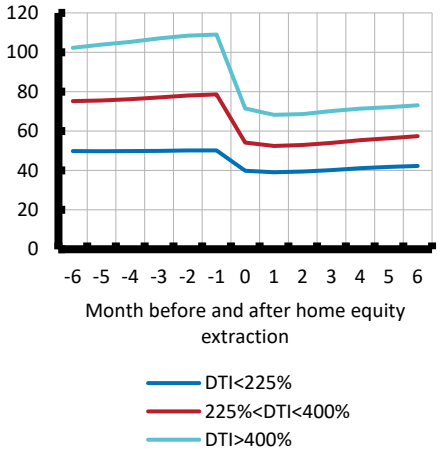
Note. The figure shows the average mortgage and unsecured debt (both in SEK thousands) outstanding for all home equity extractors with unsecured debt during the event window period.
Source: Sveriges Riksbank

The decrease in unsecured debt following home equity extraction is more substantial for more highly indebted households (Figure 8a). Extractors with debt ratios above 400 per cent in the month before extraction have decreased their unsecured debt by SEK 37,500 on average after extracting home equity, an average decrease of 34 per cent. Instead, the reduction in unsecured debt is around SEK 10,000 for households in the lowest DTI ratio group, which is only one third of the reduction in unsecured debt for extractors with higher DTI ratios.

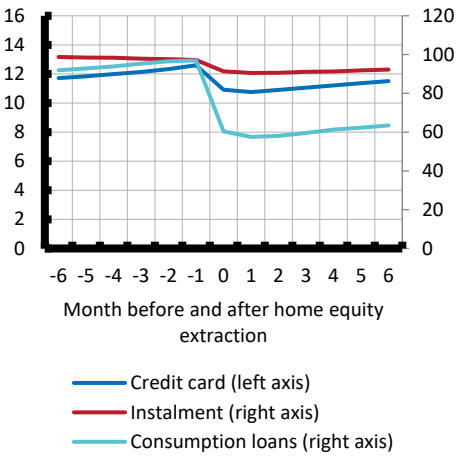
Figure 8b shows that the decrease in unsecured debt after home equity extraction is mainly driven by a decrease of consumption loans. The average consumption loan outstanding for the extractors with consumption loans was around SEK 97,000; however, the average balance drops sharply by almost 40 per cent to SEK 60,000 within the month of home equity extraction. In contrast, the reduction in the other two types of unsecured debt—credit card and instalment debt—are quite marginal, less than 15 per cent.

Figure 8. Unsecured debt outstanding before and after home equity extraction by household debt-to-income ratio or unsecured debt type

a. by debt-to-income ratio, SEK thousands



b. by unsecured debt type, SEK thousands



Note. Figure 8a shows the average unsecured debt outstanding (in SEK thousands) for home equity extractors with unsecured debt during the event window period by their debt-to-income ratios the month before extracting home equity. Figure 8b shows the average credit card debt, instalment loan and consumption loan outstanding (all in SEK thousands) for home equity extractors with the corresponding unsecured debt type during the event window period.
Source: Sveriges Riksbank

Purposes of home equity extraction

Repaying unsecured debt, in particular consumption loans, is one purpose

The sharp decrease in consumption loan outstanding after home equity extraction indicates that repaying more expensive unsecured debt, in particular consumption loans, can be one reason for extracting home equity. As interest rates on consumption loans are usually much higher compared to mortgage rates, households with consumption loans have an incentive to replace them using cheaper mortgage loans in order to decrease interest costs.[9]

To further investigate the behaviour of repaying consumption loans using home equity, we categorize all home equity extractors into four groups based on how consumption loan balances develop within 6 months after extraction: (i) without consumption loans; (ii) increased consumption loans or kept consumption loans unchanged; (iii) amortized (but not fully repaid) consumption loans; (iv) repaid consumption loans. As shown in Figure 9a, the majority (64 per cent) of households had no consumption loan outstanding when they extracted home equity. Although households with consumption loans the month before extracting home equity only account for 36 per cent of total home equity extractors, more than half of them have repaid their consumption loans. This suggests that repaying consumption loans could be one reason why those households extracted home equity. Among those extractors with consumption loans who didn't repay their consumption loans, nearly half have amortized consumption loans. In total, nearly 80 per cent of extractors with consumption loan outstanding have decreased their consumption loans (through amortization or repayment),

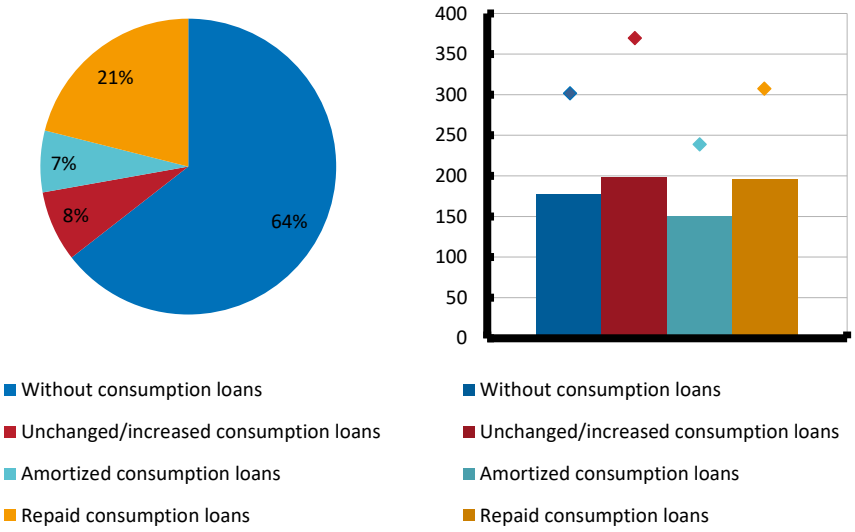
[9] Li and Zhang (2017) provided evidence that Swedish households have used the extracted home equity to pay off unsecured consumer loans. Their finding is consistent with the current study using a different sample.

which explains why the average consumption loan outstanding in Figure 8b has dropped sharply by almost 40 per cent directly after home equity extraction.

Figure 9b presents the extracted amount of home equity per extraction by extractor type. Households with unchanged or increased consumption loans after extraction have taken out most home equity, while households that amortized consumption loans extracted least home equity. Households that repaid consumption loans extracted SEK 300,000 on average, which is similar to that for households without consumption loans.

Figure 9. Home equity extraction and consumption loan balances

a. Percentage of home equity extractors **b. Extracted amount, SEK thousands**



Note. Figure 9a shows the percentage of home equity extractors categorized by the development of consumption loan balances within 6 months after extraction. Figure 9b shows the extracted amount of home equity per extraction by extractor type. The bars denote the median, while the diamonds denote the mean.
Source: Sveriges Riksbank

Figure 10 presents borrower characteristics in the month before extracting home equity for the four types of home equity extractors. Compared with other household groups, households that repaid consumption loans after home equity extraction are slightly younger, have lower income and a higher indebtedness level. This indicates that borrowers with a higher risk profile may have intended to reduce their debt-servicing costs by replacing their more expensive consumption loans using cheaper mortgage loans when housing prices go up.

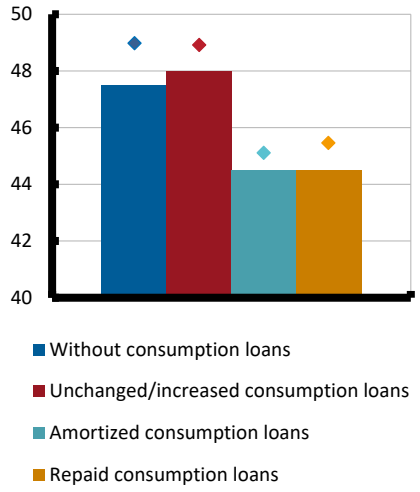
The main purpose of home equity extraction is unknown…

Overall, using cheaper mortgage debt to substitute more expensive consumption loans is not the main reason why most households extracted home equity. As shown by Figure 9a, nearly 80 per cent of total extractors didn't use home equity for consumption loan repayment (64 per cent didn't have consumption loans and 15 per cent didn't repay their outstanding consumption loans). Even for those 21 per cent of extractors who repaid consumption loans after home equity extraction, the majority of the extracted amounts were not used for repayment. As shown in Figure 11, the proportion of extracted home equity that may be used for repaying consumption loans is 40-50 per cent on average during the period of 2010-2017. This indicates that households usually extract more home equity than

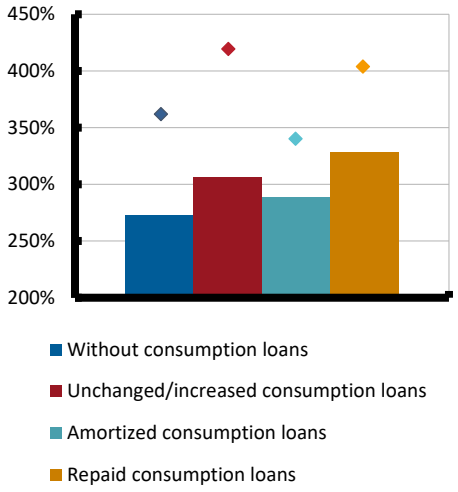
they need for consumption loan repayment, and more than half of the extracted home equity has been used for other purposes.

Figure 10. Age, income and debt-to-income ratio in the month before extracting home equity by household type in terms of consumption loan changes after home equity extraction

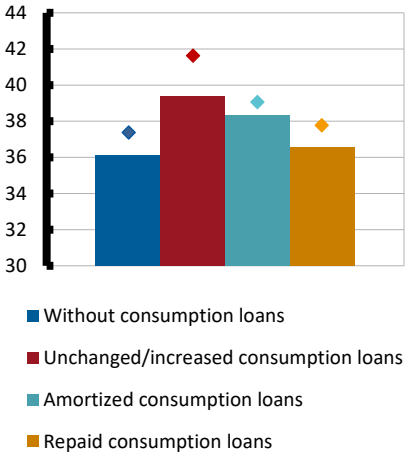
a. Age



b. Debt-to-income ratio, per cent



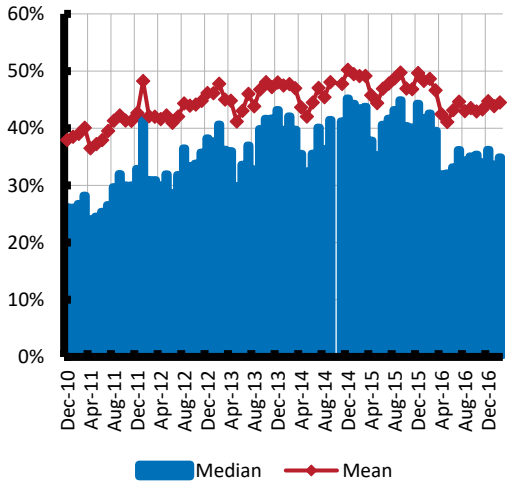
c. Income, SEK thousands



Note. The bars denote the median, while the diamonds denote the mean value.
Source: Sveriges Riksbank

Due to the data limitation, we cannot study what the majority of extracted equity is used for. However, as mentioned in previous studies, households may extract home equity for private consumption, home renovation, or helping family members buy a home. For example, households can use extracted home equity for consumption expenditures (e.g., Brown et al., 2015; Hurst and Stafford, 2004; Mian and Sufi, 2011; Agarwal and Qian, 2017; Kaplan et al., 2017). Home equity is extracted to fund retail consumption (see Abdallah et al., 2012) and durable goods consumption (e.g. McCully et al. 2019). Other studies find evidence that home equity is used for home renovation or residential investment (e.g., Davey, 2001; Almaas et al., 2015; Zhou, 2019). A few papers documented the use of home equity for business investment (e.g., Corradin and Popov, 2015; Jensen et al., 2015; Kerr et al., 2015; Schmalz et al., 2017); and for college education (e.g., Lovenheim, 2011; Lovenheim and Reynolds, 2013).

Figure 11. Percentage of extracted home equity that may be used for repaying consumption loans



Note. Due to data errors, we omit October 2014 from the chart. See the appendix for further details on the data processing.
Source: Sveriges Riksbank

In the United States, according to survey evidence, 33 per cent of extracted home equity is used for home renovation and 28 per cent for consumer expenditure. About 47 per cent of home equity extraction is used for repayment of other debts or investment (Brady et al., 2000; Canner et al., 2002; Mian and Sufi, 2011). Similarly, the consumer survey in the U.K. in 1998-2000 shows that home equity withdrawal is an important channel to finance consumption, in particular home renovation (Davey, 2001). In addition, Almaas et al. (2015) investigate home equity-based refinancing in Norway, and find that home renovation and consumption account for 33 and 32 percent of home equity loans respectively. A study using Danish household data suggests that most of the extracted equity is used to fund major durable consumption expenditure, see Bäckman and Khorunzhina (2017). In our study, we cannot directly survey households for their actual use of home equity. What is clear is that the majority of the extracted home equity is not for repayment of other forms of household debt. It points to the possibility that the majority of home equity is used for residential investment or consumption expenditure, similar to the experience in the U.S. and U.K.

Concluding remarks

Home equity extraction is a common phenomenon in many countries experiencing a high housing price growth. It enables households to benefit from the value appreciation of their home without selling it directly. At the same time, however, it could lead to higher household indebtedness.

In this staff memo, we show that home equity extraction contributes to a higher level of debt in Sweden, and can therefore dampen households' resilience to unexpected changes in housing prices, interest rates or income. By levering up against rising housing prices, a household's buffer becomes smaller, and more households could find themselves being credit constrained if housing prices were to decline in the future. Such credit constraints risk amplifying consumption responses by households. Whether this poses a risk to financial stability is a difficult question to answer. It depends on the number of households extracting equity and the amounts: this staff memo has shown that a fairly large percentage of households withdraw equity and in fairly large amounts. It also depends on the

type of households extracting equity: the fact that higher income households are more likely to extract equity should reduce the risk, whereas the fact that high-DTI households extract larger amounts amplifies the risk. It also depends on the purpose of extracting equity: although some households pay off (part of their) unsecured debt, the vast majority of households do not and overall household indebtedness rises significantly after extracting equity. And finally, it depends on households' expectations. For instance, some households might use unsecured debt to finance a down-payment, counting on rising housing prices to substitute the unsecured debt for mortgage loans after a few years by extracting equity. If their housing price expectations turn out to have been overly optimistic, they will find themselves over-indebted and severely constrained during any downturn.

Given that home equity extraction leads to higher household indebtedness in Sweden, it is important to monitor how home equity extraction activities develop in the future. As our experience from the global financial crisis of 2007-09 has shown, high household indebtedness could amplify macroeconomic shocks and might threaten financial stability. Also, according to the literature, home equity extraction for consumption purpose could lead to households being over-indebted. Therefore, additional data and research are needed to understand the main purpose of home equity extraction by Swedish households.

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Appendix

Data processing

The data used in this staff memo is monthly loan-level data from the eight largest credit institutions in Sweden, which is collected by the Riksbank from the credit bureau UC AB. The data includes information on the loan amount, the type of credit (loans collateralized by tenant-owned apartments or single-family houses, credit cards, instalment loans and consumption loans) and a serial number for loan takers.[10] UC also provides information on borrower characteristics such as before and after tax income, age, gender, marital status, municipality, a serial number replacing the address, and property data.

The definitions of households and household characteristic variables such as age, income, and DTI ratio are in line with a previous Economic Commentary "The indebtedness of Swedish households—Update for 2017".[11] The household definition is constructed using

1) Marital status (for married individuals)
2) Shared address and loans

Single individuals are also included as one-person households in the analysis.

The household's mortgage debt for each month is computed by summing the loan amount outstanding for both tenant-owned apartments and single-family houses. The household's unsecured debt for each month is computed by summing the loan amount outstanding for credit cards, instalment loans and consumption loans. The total debt for the household for each month is computed by summing all loan amounts for a given household. Household age is computed as the average age among household members. The main income measure we use in this study is the household's total after-tax income, which is computed by first computing each household member's gross professional income minus taxes not related to capital gains or losses, and then adding together all household members. The DTI ratio is computed as the ratio between total debt and total after-tax income.

As we are only interested in homeowners, we exclude households without mortgages. We also exclude households with too short a time series (less than 12 months) for studying home equity extraction behaviour. To avoid measurement errors, we exclude households lacking information on income measures or address, households with missing or negative income, and households with members living in different municipalities or zip codes. After data processing, the total number of households in the sample for analysis is 2,595,411, observed on a monthly frequency.

Identification of home equity extraction

In Sweden, extracting home equity is mainly through mortgage refinancing. A household can raise the amount of their mortgage against increased home equity, which is the difference between the market value of the home and the mortgage outstanding. The UC data provides information on monthly mortgage debt outstanding for each household. Therefore, we can identify home equity extraction events for each household in a given month by comparing the mortgage outstanding in that month with the mortgage outstanding in the previous month. If the change of mortgage outstanding is positive, it indicates that the household may have extracted home equity in that month. Sometimes, we observe an increase in mortgage debt by a small amount. As renewing a mortgage contract is

[10] The serial number is a de-identified version of the personal number. The actual personal number and the key between the serial number and the personal number are not known to the Riksbank's staff.
[11] See Blom and van Santen (2017), and references therein.

costly for households, to avoid measurement errors, we require that the increase of mortgage outstanding in a given month should be at least SEK 50,000 in order to be identified as a home equity extraction event.[12]

However, an increase in mortgage debt by at least SEK 50,000 in a given month could also occur when the household purchases a new home or an additional property. As we focus on the effect of home equity on activities that are not property investment, we identify a home equity extraction event as an increase in mortgage of at least SEK 50,000 without purchasing new properties or moving to a new home within the following three months. The data provides information on the home type (tenant-owned apartment and single-family house) that the mortgage is linked to and the number of properties by each property category (farming property, plot used for housing, one- or two family house, smaller house or holiday cottage, other) that the household owns. This enables us to identify whether the household has changed the home type or purchased additional properties. If the household moves to a new home but with the same home type, we can identify moving by observing the changes in the household's address. In short, we classify equity extraction by following stable households over time that do not move, do not buy houses and do not change household composition in a (rolling) twelve-month period, and increase their mortgage debt by at least SEK 50,000 in this period. Finally, we exclude all home equity extraction events identified in the month of October 2014 due to data errors for that month. According to the definition described above, we have identified 1,294,016 home equity extraction events between December 2010 and February 2017.[13]

[12] We have tested other thresholds such as SEK 20,000 or SEK 100,000. Changing this threshold matters for the levels we find in this study (for instance the percentage of households withdrawing equity as well as the extracted amount), but does not impact the trends or correlations we find using our SEK 50,000 threshold.

[13] The UC data is in monthly frequency from June 2010 to August 2017. However, as we require a 13-month event window for analysis, the sample period with home equity extraction events is between December 2010 and February 2017.

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