

Liquid assets of Swedish households

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**Michael K. Andersson
and Roine Vestman***

The authors work at the Economic Analysis Office at FI. R. Vestman is also Associate Professor at Stockholm University.

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Summary

Macroeconomic research emphasises that savings buffers, consisting of liquid financial assets, help households manage a loss of income and unexpected expenses. Small buffers mean that households must choose between borrowing more, consuming less or, in a worst-case scenario, experiencing payment problems. If many households with small buffers were to experience such problems, for example during an economic recession, demand in the economy could drop significantly.

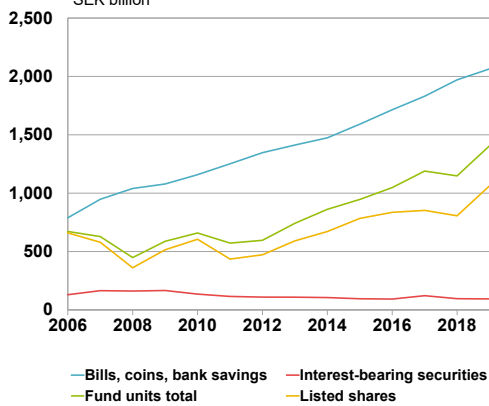
Aggregate statistics indicate that households hold significant liquid assets. Today, the aggregate value corresponds to an average of almost SEK 1 million per household. However, because these buffers are unevenly distributed between households, the average is a poor measure for assessing the risk of a significant drop in consumption. The percentage of households with small holdings of liquid assets is a better measure. This measure requires information about how liquid assets are distributed across households. We use a so-called capitalisation method based on income statement data for different types of capital incomes to calculate each household's liquid assets in 2012. Even though the data is eight years old, there are circumstances that indicate that the distribution should be similar today. For example, survey evidence on the percentage that cannot pay an unexpected expense of SEK 12,000 within one month has largely remained the same since 2008.

We find that a large percentage of households have small holdings of liquid assets: approximately 45 per cent of households had less than SEK 100,000, and the median household had around SEK 130,000 in 2012. This can be compared to aggregate statistics from 2012, which indicate that Swedish households on average had SEK 580,000 in liquid assets. In other words, our calculations confirm that the distribution is much skewed.

For many households, their holdings of liquid financial assets are also small in relation to their disposable income. Approximately one out of ten households holds liquid assets corresponding to at the most two months' disposable income, and one out of three households holds liquid assets corresponding to at the most four months' income. These results are in line with both similar studies of other countries and Swedish surveys.

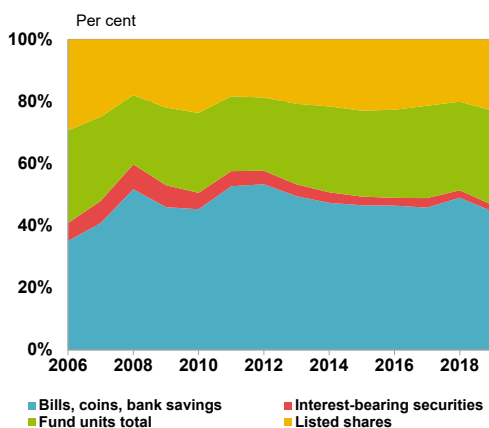
Households with large loans or high loan-to-income ratios are sensitive to both a fall in income and higher interest expenses. We find that the liquid assets are just as unevenly distributed among households with the largest interest expenses. Overall, this means that the holdings of liquid assets of a large percentage of households are so small that these households may be forced to immediately reduce their consumption expenses following an economic shock.

Diagram 1. Household sector's liquid assets
SEK billion



Source: Statistics Sweden

Diagram 2. Various assets' share of liquid assets
Per cent



Source: Statistics Sweden

Household sector has large holdings of assets...

A household's possibility to maintain its consumption is dependent on its buffer, which consists of liquid assets and any unutilised lending. Liquid assets, or, in layman's terms, *savings*, can provide resilience to temporarily impaired finances and smooth out consumption.

Therefore, households with liquid assets constitute a smaller risk to macroeconomic stability and, by extension, financial stability than households that do not have liquid assets. To assess the economy's sensitivity to a temporary worsening of conditions, it is important to know how the assets are distributed between households. This FI Analysis investigates this specific distribution.

Households' assets can be broken down into groups: financial and real. Real assets, which includes the home, are generally illiquid. Most financial assets, however, are liquid. We define liquid assets as the sum of bills, coins, bank savings (deposits), interest-bearing securities, fund units, and listed shares.¹ Fund units in the pension system or unlisted shares cannot be sold immediately, and we therefore do not include these as liquid. The most liquid assets a household can have is cash and bank savings. In addition to these savings being easily accessible, they are beneficial in that they do not fall in value during an economic downturn.²

The total liquid assets of the Swedish household sector have increased sharply in the 2000s (Diagram 1). In total, the bank deposits and cash of Swedish households amounted in 2019 to approximately SEK 2,150 billion.³ This is approximately the same as households' total disposable income for one year.⁴ Listed shares, interest-bearing securities and funds are also liquid since they can be sold quickly. But it is likely that their value will fall during economic recessions.⁵ In 2019, these three items amounted to almost SEK 2,500 billion.

Over time, bank deposits and holdings of fund units have grown somewhat faster than holdings of listed shares and interest-bearing securities (Diagram 1). In 2019, bank deposits and fund units represented three-fourths of households' total liquid assets (Diagram 2). The corresponding ratio in 2006 was 65 per cent.

Swedish households' total assets – except assets in the pension system – amounted to SEK 13,000 billion in 2019 (Table 1). This means that

1 By *liquid assets*, we mean assets that can quickly be used for payments. In this analysis, we define this as bank deposits, bonds, unlisted shares and fund units that are not part of the pension system, which in SCB's Financial Account corresponds to the items FA2, FA3200, FA5110 and FA5200.

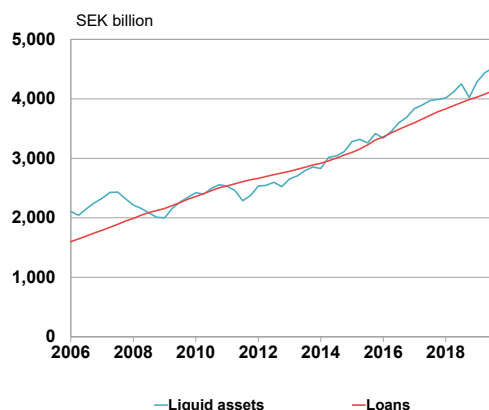
2 Bank savings, bills and coins have a stable value in nominal terms, but inflation impairs their buying power.

3 Since 2006, bank deposits, bills and coins have increased by 162 percent. During the same period, Sweden's population has increased by 13 percent.

4 In 2018, households' disposable income amounted to SEK 2,184 billion; see Statistics Sweden (Income and taxes).

5 In addition, different assets' liquidity can also be influenced in different ways depending on the shock that hits the economy.

Diagram 3. Liquid assets and loans of Swedish households



Source: Statistics Sweden

Note: The most recent observation is from Q3 2019.

households together have SEK 8,500 billion in net wealth (assets minus loans).⁶

Table 1. Household loans and parts of assets (excluding pension assets and unlisted shares).

(SEK billion)

Assets	12,962	Liabilities and equity	12,962
Single-family dwellings*	5,453	Mortgage	3,429
Freehold apartments*	3	No collateral	245
Tenant-owned apartment, holiday home abroad**	2,991	Other collateral	515
		Education loans	229
<i>Real assets</i>	<i>8,447</i>	<i>Loans</i>	<i>4,419</i>
Deposits, bills, coins, bonds	2,159		
Listed shares	987		
Funds	1,369		
<i>Financial assets</i>	<i>4,515</i>	<i>Part of equity (part of net wealth)</i>	<i>8,543</i>

Source: Statistics Sweden (Savings Barometer, Financial Market Statistics and Real Estate Portfolio).

Note: The figures refer to November 2019. Pension assets and liabilities that do not consist of loans are excluded from the balance sheet. *Calculated using the tax assessment value. ** Statistics Sweden classifies shares in tenant-owner associations and holiday homes abroad as financial assets, but they are placed under real assets here. In addition, we have not considered assets in the form of cars, art, gold, and other precious stones, and assets abroad.

Swedish households' loans have grown just as fast as their liquid assets since the mid-2000s (Diagram 3). The increase can be primarily attributed to mortgages, but loans without collateral (unsecured loans and credit card debt) have also increased a lot during certain periods. In 2019, household loans amounted to almost SEK 420 billion.⁷ Households with large loans (relative to their income) tie up a large portion of their future income in interest and amortisation payments. This occurs particularly when interest rates are high. A large loan can therefore make households vulnerable (in the sense that they cannot maintain their consumption during economic recessions) if they do not have buffer savings in the form of liquid assets.⁸ If many households are unable to maintain their consumption, this could have an impact on macroeconomic development in general. This FI Analysis therefore

⁶ We have not included in the calculation debt from anything other than loans. Examples of other types of debt could be tax debt, unpaid traffic debt, unpaid education loans, unpaid childcare allowance, and various subscription debts.

⁷ The figure refers to Statistics Sweden's data from monetary and financial institutions (MFIs).

⁸ Depending on the type of shock to which the household or economy is exposed, households could use additional loans as a buffer. This can be relevant in some scenarios analyses or stress tests. In this analysis, we disregard this possibility since the aim is primarily to document the distribution of liquid financial assets.

also analyses the distribution of liquid assets given different interest rates.⁹

...but assets are unevenly distributed

The fact that the household sector's liquid assets are the same size as its loans can give the impression that Swedish households' resilience to shocks is satisfactory. But aggregate assets say little about individual households' buffers. For example, Swedish households had on average SEK 960,000 in liquid financial assets in 2019. This is not an accurate reflection for most households since the distribution of assets is very uneven.¹⁰ In order to be able to assess an economic shock's total impact on consumption, it is therefore necessary to know the buffers of individual households. This is a central insight from macroeconomic research (see Kaplan and Violante, 2018).

Kaplan et al. (2014) documents, therefore, the share of households that have a small buffer – small holdings of liquid assets and low creditworthiness – as well as how this share varies among households with different net wealth and loan-to-value ratios. Findings in the USA, for example, show that 30 per cent of households do not have any buffer left just before their next salary pay-out. Such households are said to live “hand to mouth”. Findings also show that the share of households without liquid assets just before the next salary pay-out is somewhat higher for households with high loan-to-value ratios.¹¹

Unfortunately, there are no statistics in Sweden that make it easy to conduct a comparable analysis. Sweden has no aggregate data on individual households' assets or loans.¹² Statistics Sweden reports Sweden's so-called cash margin, i.e., the ability to pay an unexpected expense of SEK 12,000 within one month (Statistiska centralbyrån, 2020), but more in-depth analysis, for example of various sub-groups, is not possible. Data is available about income, standardised income from assets, and loan expenses. This data comes from the annual income statement in tax returns and is compiled by Statistics Sweden in a register. This register contains data on interest expenses for loans, income interest rates from bank accounts, standardised income from investment savings accounts and fund units, dividends from shares in a custodian account and coupon rates from bonds in custodian accounts.

Much like the capitalisation method in Lundberg and Waldenström (2018), we use the income statement data to estimate individual households' liquid assets in 2012. We use 2012 since the interest rates were still favourable then in terms of calculating deposits. An appendix describes the method in more detail.¹³ This method, from an

⁹ We do not have information about household loans, only their interest rate expenses (see appendix).

¹⁰ The average is based on aggregate statistics.

¹¹ We use the term “buffer” rather than “liquid assets” intentionally to describe the results since the findings assume that all households can borrow one monthly salary and use it as a buffer.

¹² The major banks sometimes conduct savings surveys; see, for example, Nordea (2019). But these surveys have a limited coverage.

¹³ Up through 2007, the banks also reported loan amounts and the value of financial assets to the Swedish Tax Agency, so-called positions///. This data served as the basis for the wealth tax. When the Government removed the tax, it also removed the obligation to report this data

international perspective, is a common way to analyse inequalities in wealth (see Saez and Zucman, 2016). One advantage of using register data from Statistics Sweden is that the distributions of liquid assets can be flexibly documented for various sub-groups, for example “young households” or “households with high interest rate expenses” since Statistic Sweden's income statement data register can be matched to its other registers. After we created this data set, our analysis of distributions is similar to the one carried out by Kaplan et al. (2014).

ESTIMATION OF ASSETS

We estimate deposits using interest income

We estimate the size of an individual's deposit using a capitalisation method. For bank deposits (bank savings), the method is based on households' observed interest income, which is equal to the position (balance) multiplied by a deposit rate. We assume that all individuals face the same average deposit rate. This assumption generates an estimate of an individual household's deposits. The calculation is less exact when the interest rate is low. If the interest rate is 0 per cent, as is the case for many savings accounts right now, the individual does not receive any interest income, and thus nothing is reported to the Swedish Tax Agency. Even if the interest rate is positive but low, many people will not be subject to the reporting requirement since total interest income on bank savings of less than SEK 100 does not need to be reported to the Swedish Tax Agency. In our assessment, 2012 is a good year to start with since the deposit rate on bank accounts has been very low thereafter (see the appendix). At the end of the analysis, we discuss the credibility of the results given that the data is eight years old.

We estimate fund units and investment savings accounts using standardised income

It is relatively uncomplicated to estimate the value of an individual's fund holdings (fund units) and investment savings accounts (ISK).¹⁴ The income statement data contains information about standardised income. It is based on a standardised rate of 0.4 per cent for fund units. For investment savings accounts, the standardised rate varies. In 2012, it was 0.55 per cent. The amount of the assets is estimated by capitalising the standardised income, i.e., the income divided by the standardised rate.

We estimate directly owned shares and bonds with dividends.

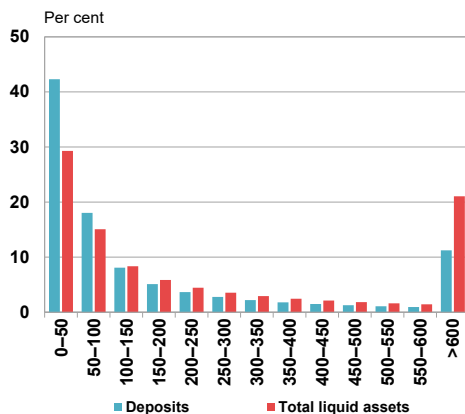
To estimate the value of the shares held directly by the individual (excluding those included in the investment savings account) and bonds, we use income statement data on dividends and coupons. The dividends are broken down per share and identified by ISIN number. In 2012, roughly every fourth household held shares that paid a dividend, and 0.4 per cent of the individuals owned bonds with coupon payouts in 2012.

Once we estimated every individual's holdings, we totalled these holdings for every member of the household. All statistics hereafter

to the Swedish Tax Agency. We use income statement data from 2007, including positions///, to validate our method. See Appendix 1.

14 Note that we disregard holdings of funds in the pension system since these are not liquid.

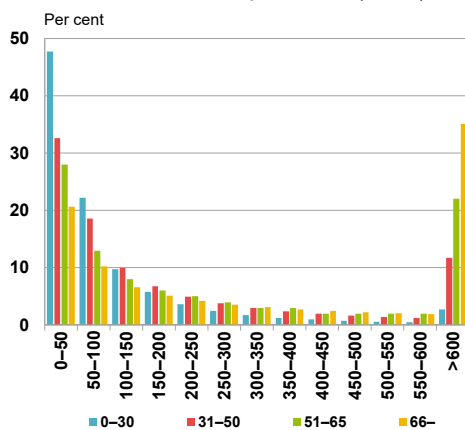
Diagram 4. Households broken down by deposits and total liquid assets (TSEK)



Source: FI and Statistics Sweden.

Note: The X axis shows the interval for each variable.

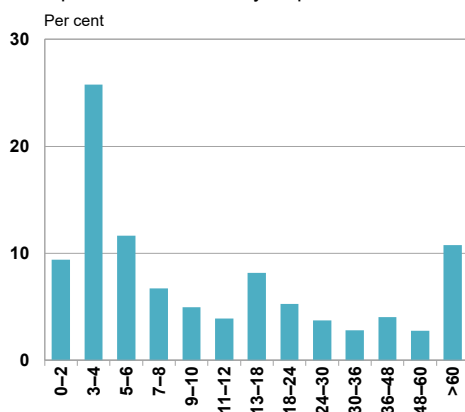
Diagram 5. Households broken down by age and amount of total liquid assets (TSEK)



Source: FI and SCB

Note: The age of the household refers to the oldest member. The X axis shows the interval for each variable.

Diagram 6. Households broken down by total liquid assets divided by disposable income



Source: FI and Statistics Sweden.

Note: The X axis shows the number of months the household can maintain its existing expenses using liquid assets. The X axis shows the interval for assets divided by income.

are reported at household level. The age of the household refers to the oldest individual in the household.

ALMOST HALF HAVE LESS THAN SEK 100,000 IN LIQUID ASSETS

Our calculations show that liquid assets are unevenly distributed. Almost 30 per cent of the households have less than SEK 50,000 in (total) assets, and 45 per cent have less than SEK 100,000 (Diagram 4). This can be compared to the average from the aggregate data corresponding to that presented in Table 1 but for 2012. The average then was SEK 580,000, and the average borrower had around SEK 130,000 in liquid assets.¹⁵ Deposits are the most liquid asset and maintain their value even when asset prices change. Just above 60 per cent of households had less than SEK 100,000 deposited in the bank, including the balance of the account to which the salary is paid. This means that a large percentage of households have no or very little other bank savings. When the other asset classes are added, the percentage of households with small holdings of liquid assets falls somewhat, but not a lot. This means that deposits are the dominant asset class for most households that have low savings. In other words, the diversification between different types of assets is limited in this category of households. When we consider all liquid assets, half of the households have less than SEK 150,000.

Older households have more savings than younger households. Approximately every third household over the age of 65 has more than 600,000 in liquid assets. Among those that are over 65, every fifth household has less than SEK 50,000 in liquid assets (Diagram 5). Every other household under the age of 30 has less than SEK 50,000.

A better way to measure the savings buffer can be to place liquid assets in relation to income – by calculating the ratio between assets and disposable income, i.e., gross income minus tax plus transfers. The ratio shows that every tenth household has less than two months of income in liquid assets (Diagram 6). This means that 10 per cent of the households can live with their liquid savings buffers less than two months if they were to completely lose their disposable income.¹⁶ Around 35 per cent of the households can cover at most a loss of four months of income using their liquid assets.

HOUSEHOLDS WITH LOANS ALSO HAVE SMALL HOLDINGS OF LIQUID ASSETS

We have shown that households' liquid assets and savings buffers are unevenly distributed. A large share of households can only use liquid assets to maintain their existing expenses for a few months. One interesting question is if this applies even to households with large loans or high loan-to-income ratios, since these households are not only sensitive to a loss of income but also to an increase in interest

¹⁵ Table 1 shows SEK 4,515 billion for 2019. For 2012, the corresponding figure is SEK 2,524 billion. The number of households for 2019 and 2012 was 4.72 and 4.36 million, respectively.

¹⁶ This is just an estimate. It is not certain that individuals have costs that are as large as their income. Individuals who lose their disposable income have the possibility of reducing their consumption, and thus some of their costs. It is also not certain that the value of their liquid assets will be as large in a situation where unemployment is increasing. In addition, most have unemployment insurance, which means their income will not go down to zero. Our point, though, is that households with a small buffer will immediately choose to reduce their consumption in order to avoid rapidly using up their buffers.

rates. Unfortunately, we do not have information about principal amounts for 2012. Therefore, we create groups using interest rate expenses (see Diagram B3 and B4 in Appendix 1).

We have broken the households into four groups based on how big their interest payments are:

1. Households with interest expenses below the median in Sweden. This means interest expenses less than SEK 650 per month. This amount corresponds to a mortgage of almost SEK 230,000 estimated using the average mortgage rate. Roughly half of the households had no loan payments.
2. Households with interest expenses between SEK 650 and SEK 1,900 per month (50th to 65th percentile).
3. Households with interest expenses between SEK 1,900 and SEK 3,900 per month (65th to 80th percentile).
4. Households with interest expenses between SEK 3,900 and SEK 8,600 per month (80th to 95th percentile). We disregard households with the 5 per cent highest interest expenses to obtain robust results since there is reason to believe that this category is more heterogeneous: households with large mortgages, households with relatively small but expensive loans, and self-proprietorships.

It is reasonable to believe that Group 1 primarily consists of households with no or small loans, and Group 4 consists of households with large loans. We therefore assume going forward that there is a correlation between interest rate expenses and the size of the loan.

There is a large percentage of households without loans or with small loans that have small holdings of liquid assets (Diagram 7). Around 35 per cent of these households have less than SEK 50,000 in assets. This is largely because they are young households. There are fewer young households that work, compared to other age groups, and this impacts both loans and savings. And those that work normally do not have incomes that are as high as older households. Young households also have not had as much time to borrow and save.

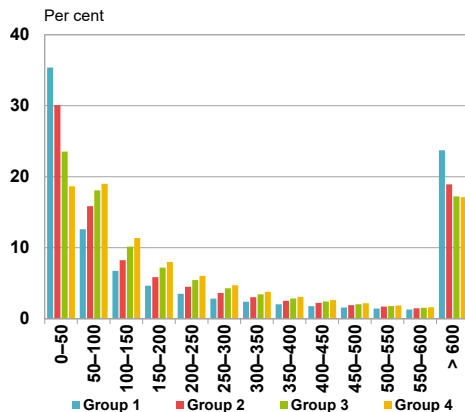
Among those that have the largest loans, just under 19 per cent have less than SEK 50,000 in assets, which is a smaller percentage than among households in general. But even among households with the largest loans, almost 40 per cent have less than SEK 100,000 as a buffer, which is marginally less than among households in general, where the percentage was 44 per cent.

Households with small loans are also overrepresented among those that have the largest liquid assets. Approximately every fourth household with small loans has assets that are larger than SEK 600,000, while among households that have the largest loans 17 per cent have more than SEK 600,000 in liquid assets.

STABILITY OF THE DISTRIBUTION OVER TIME

Our results are based on data that is eight years old. Are they still representative of household balance sheets today? Since the aggregate assets have increased since 2012, there are probably differences in the

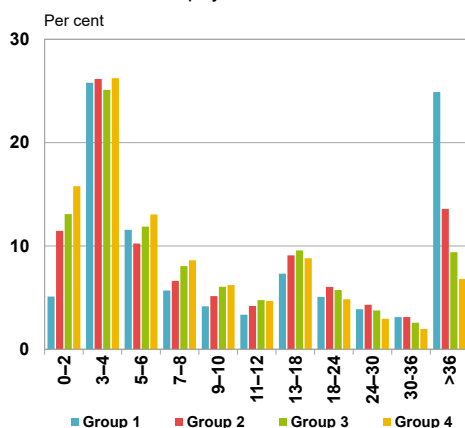
Diagram 7. Households broken down by interest expense and amount of total liquid assets (TSEK)



Source: FI and Statistics Sweden.

Note: Group 1 is households with no or small loans, and Group 4 is households with large loans. The X axis shows intervals for interest rate expenses divided by income for the four groups.

Diagram 8. Households broken down by total liquid assets divided by disposable income per size of interest payments



Source: FI and Statistics Sweden.

Note: Group 1 consists of borrowers with interest rate payments divided by income lower than the median, and Group 4 is borrowers with the highest interest payments in relation to income (between the 80th and 95th percentile). The X axis shows intervals for assets divided by income for the four groups.

distribution between 2012 and now. But there are several indications that the share of households with low liquid assets may be more or less the same. It is a well-established fact in many countries that a lot of households have small savings buffers. Kaplan et al. (2014) shows this, as does a recent survey from the OECD (OECD 2020).

The results are also in line with Statistics Sweden's Survey of Living Conditions, which for 2018–2019 shows that between 20 and 30 per cent of Swedes in the age group 16–64 cannot pay an unexpected expense of SEK 12,000 within one month. This percentage has not changed since 2008 (SCB, 2020). Nordea has recently reported similar results (Nordea, 2019). There are also factors that indicate that liquid assets may be more unevenly distributed today than they were in 2012, such as greater income inequality and continued rising housing prices and, thus, larger debt. FI's amortisation requirements may also have contributed to this if they shifted savings in cash and cash equivalents to amortisation payments (see Svensson, 2020).¹⁷

Many households have small holdings of liquid assets

Given a temporary shock to their finances (for example, a loss of income or higher interest rates), households can maintain their consumption by using their liquid assets or increasing their loans. Depending on the exact scenario, this increases the risk of a drop in consumption that will impact the macro economy if more households have smaller holdings of liquid assets. Households that have loans are also exposed to interest rate increases. Households with large debt may also find it more difficult initially to offset shocks by taking on new loans. Therefore, it is particularly important for borrowers to have a savings buffer.¹⁸

One measure of households' resilience to loss of income is how long a household can live off of its liquid assets. This amount of time is dependent on the households' assets and expenses, as well as whether the asset maintains its value in a stressed scenario. The change in the value is dependent on the type of shock that hits the economy. Since we do not have data on the expenses of individual households, we choose again to place assets in relation to disposable income.

There are differences in the distribution of liquid assets for those that have small and large loans.¹⁹ Approximately 5 per cent of households that have no or small loans have assets corresponding to only two months' salaries or less (Diagram 8). In comparison, 15 per cent of households with the largest loans have liquid assets worth less than two months' salary. And 40 per cent of households with the largest

¹⁷ Bernstein and Koudijs (2020) investigate this correlation for the Netherlands and do not find that savings are shrinking.

¹⁸ See, for example, Table 5 in Flodén et al. (2020) for differences in consumption response between households with small holdings of liquid assets as a result of changes in the Riksbank's key interest rate.

¹⁹ For those without loans or with small loan expenses, we include households whose expenses are under the Swedish median. Those with high expenses – large or expensive loans – are those who are in the 80th to 95th percentile.

loans have liquid assets that are worth less than four months' salary, compared to 35 per cent for all households.

Approximately half of the households with small loans have assets corresponding to less than one yearly salary, while three out of four households with large loans have less than one yearly salary. The distribution for households that have mid-sized loans lies between the distributions for households with small loans and households with large loans.

Overall, the results indicate that the holdings of liquid assets of a large percentage of households are so small that these households may be forced to reduce their consumption expenses immediately following a financial shock, for example unemployment. Households with high borrowing costs are more vulnerable than households without loans – both due to the loans and because they have smaller holdings of liquid assets. All else equal, households with large or expensive loans have expenses that households without loans do not have. But since most households can bridge temporary financial set-backs, it is not probable that loans would lead to extensive credit losses for lenders. It is instead more likely that households with temporary financial set-backs would be forced to reduce other expenses. If many households end up in such a situation at the same time, it is probable that this would have a negative impact on the macro economy through falling demand.

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Appendix 1. Computations of assets and liabilities

This appendix presents the computations we make in this FI Analysis. In Appendix 2 we specify how these computations can serve as a basis for constructing balance sheets for households in other data sets, for example Finansinspektionen's mortgage survey or analysis of consumer credit. Appendix 2 also proposes analyses that are possible with constructed balance sheets.

UNDERLYING DATA

We used data from Statistics Sweden. The base is the Total Population Register (RTB) the Income and Taxation Register (IoT). RTB and IoT include data on household composition, age, disposable income, etc. These registers in turn match the Income Statement Data Register (KURU). Income statement data forms the basis for taxation, and financial institutions send this data to the Swedish Tax Agency. The period of our initial analysis is 2000–2016. Up through 2007, KURU contained data on loans and financial assets – so-called positions or balances – since they were used as a basis for the wealth tax. The wealth tax was abolished in Sweden in 2007, and the Swedish Tax Agency thus stopped gathering income statement data about each individual's positions. As of 2008, the data only includes income flows and standardised tax. We use Statistics Sweden's definition of household throughout our analysis. Prior to 2012 we refer to *family household* (familjehushåll), and thereafter we refer to the so-called *joint-economy household* (kosthushåll), which is based in part on the Apartment Register. We sum all the variables of all household members and define the household based on the oldest individual in the household. When we report the ratio between liquid assets and disposable income, we exclude the few households that have negative disposable income.

KEY YEARS IN THE CALCULATIONS

We have used the capitalisation method from Lundberg and Waldenström (2018) on two annual cohorts of data. We first used data from 2007 to validate the method. We use the income flows from 2007 to capitalise the positions for 2007, which we then compare to the positions actually reported. We then used income flows from 2012 to capitalise the positions. The reason we did not use a later year is because of the reporting rule for bank deposits (income statement data 20, KU20). Low deposit rates, like during the years 2013–2016, mean that a large number of households disappear from KU20. In order to reconcile and adjust our calculations, we looked at aggregate data from Statistic Sweden's Financial Accounts for comparison.

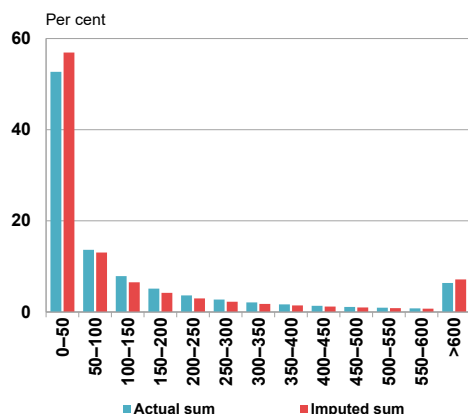
In the last section, where we describe how balance sheets can be created in other household surveys, we specify how information from previous years can be used for extrapolation.

CAPITALISATION OF FLOWS FOR POSITIONS AND VALIDATION FOR 2007

Deposits in bank accounts and interest income

Income Statement Data 20 (KU20) contains information about income from deposits. The income is calculated as

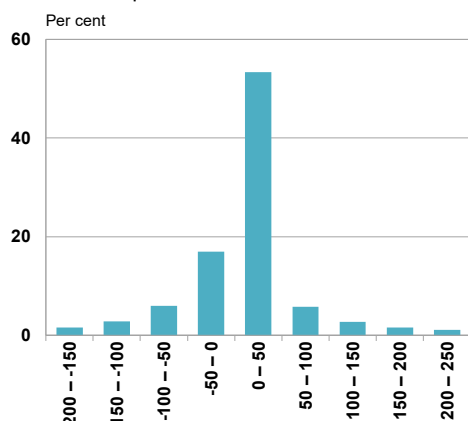
Diagram B1. Validation of imputed deposits 2007.



Source: FI and Statistics Sweden.

Note: Ange anmärkning

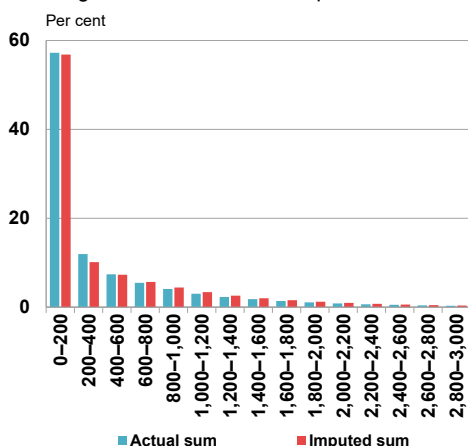
Diagram B2. Difference between imputed and actual deposits 2007.



Source: FI and Statistics Sweden.

Note: Ange anmärkning

Diagram B3. Validation of imputed debt 2007.



Source: FI and Statistics Sweden.

Note: Ange anmärkning

$$(B1.1) \quad I_{it}^B = r_{it}^1 b_{it}^1 + r_{it}^2 b_{it}^2 + \dots + r_{it}^l b_{it}^l,$$

where r_{it}^k and b_{it}^k are, respectively, interest rate and holdings of individual i 's different bank accounts. Equation B1.1 can be written as

$$(B1.2) \quad I_{it}^B = r_{it}^B b_{it},$$

where b_{it} is total deposits and r_{it}^B a volume-weighted interest rate. We use an aggregate capitalisation interest rate r_t^B as approximation for each individual's deposit rate:

$$(B1.3) \quad \sum_{i=1}^N I_{it}^B = r_t^B \sum_{i=1}^N b_{it},$$

This means that we assume that everyone with bank deposits has the same interest rate in the calculations. We calculate the value of aggregate income rates, $\sum_{i=1}^N I_{it}^B$, by summing the values in KU20. We obtain the value of the aggregate positions, $\sum_{i=1}^N b_{it}$, from the Financial Accounts. Given this interest rate, we can then calculate each individual's total bank assets as

$$(B1.4) \quad \hat{b}_{it} = \frac{I_{it}^B}{r_t^B}.$$

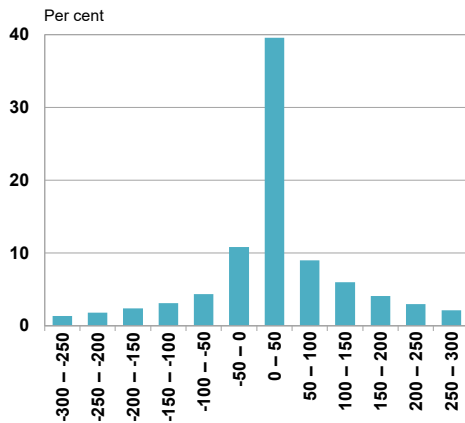
We call $\hat{b}_{it}$ the imputed value of bank deposits.

We can validate the method for 2007. The Financial Accounts show that household deposits were SEK 954 billion while KU20 shows an aggregate position of SEK 834 billion. This means that KU20 covers 87.4 per cent of the aggregate. We assume that the degree of coverage is constant over time and use this to adjust equation (B1.3). The capitalisation interest rate r_t^B is then 1.92 per cent. This is close to the volume-weighted interest rate according to the monetary and financial institutions' reporting to Statistics Sweden, which was 2.05 per cent. We distribute the remaining percentage of the aggregate (12.6 per cent) evenly across all households; in other words, we add SEK 24,733 to each household. A uniform distribution for this percentage of the aggregate is a conservative distribution assumption from a vulnerability perspective. At the same time, it is reasonable to assume that cash, which is included in the Financial Accounts, is more equally distributed than deposits. The distribution of imputed and actual values is similar (see Diagram B1). Marginally more households have low imputed values compared to low actual positions. Diagram B2 shows the distribution of the difference (imputed minus actual). Around 70 per cent of the households have a lower absolute error than SEK 50,000. The correlation between imputed and actual values amounts to 0.35 for all households but increases to 0.84 if the 99th and 100th percentiles among the positions and the imputed values are removed.

Loans and interest expenses (KU25)

In a corresponding manner for deposits, households' loans can be imputed based on Income Statement Data 25. Once again, we assume that all loans have the same interest rate. The distributions of actual and imputed loans for 2007 are very similar (see Diagram B3). Diagram B4 shows the difference between imputed and actual loans. For 87.3 per cent of the households, the absolute error is less than SEK 300,000.

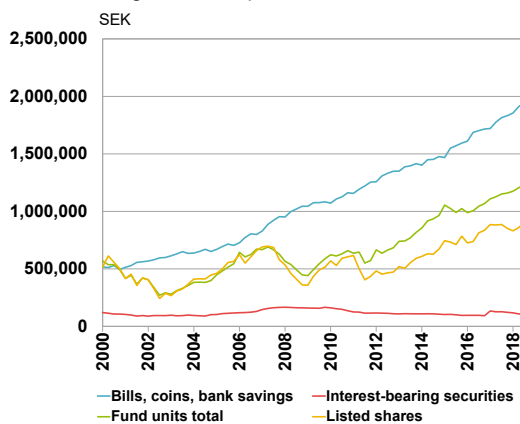
Diagram B4. Difference between imputed and actual loans for 2007.



Source: FI and Statistics Sweden.

Note: Ange anmärkning

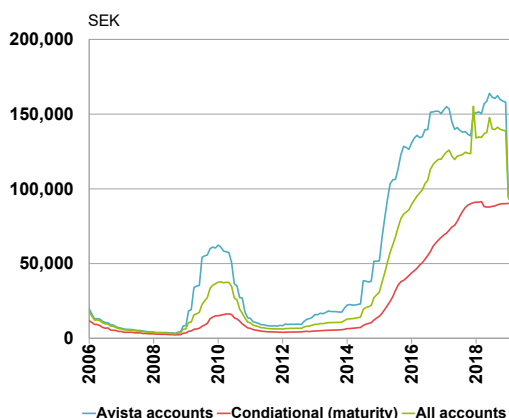
Diagram B5. Liquid financial assets.



Source: Statistics Sweden.

Note: Ange anmärkning

Diagram B6. Smallest deposit that generates SEK 100 in income interest.



Source: FI and Statistics Sweden.

Note: Ange anmärkning

Several additional observations about loans are possible. Loans (basically) always have an interest rate and interest payments that are reported to the Swedish Tax Agency from the first krona. It is therefore easier to estimate the size of the loan. But there are large differences between loan types. Mortgages are often large and have low interest rates. And other loans are often small and have a high interest rate. Therefore, the information is the average interest rate (across all loans) and it is the imputed value of total loans that give a rough estimate of the loan burden. To do a better estimate, we need to break down mortgages and other loans as follows.

$$(B1.4) \quad I_{it}^L = r_{it}^M l_{it}^M + r_{it}^U l_{it}^U,$$

where l^M means mortgages and l^U other loans. This requires additional assumptions. In this FI Analysis, we stop at comparing financial assets for households with different interest expenses.

IMPUTING AFTER 2007 – CONSIDERATIONS

Deposits in bank accounts

Diagram B5 shows the development in deposits, fund units, interest-bearing securities and listed shares in the Financial Accounts. Since 2007, household aggregate bank deposits have been growing sharply – from around SEK 1,000 billion in 2007 to SEK 2,000 billion in 2018. The deposit's share of total liquid assets (defined as the sum of the above asset classes) has increased from 41.0 per cent to 46.3 per cent. It is therefore particularly important to capture the distribution of deposit.

After 2007, Income Statement Data 20 has been limited. Interest income from a bank account is only reported to the Swedish Tax Agency if it is at least SEK 100 a year. This means that small bank account holdings will not generate enough income to be seen and the size of the interest rate affects the measuring accuracy of Income Statement Data 20. Diagram B6 uses volume-weighted interest rates that are reported to SCB from monetary and financial institutions to show the smallest deposit amount that generates SEK 100 in interest income. Up until 2012, relatively small amounts were enough to generate sufficient interest income. After then, when interest rates fell, the lowest balance increases sharply. We therefore create a distribution of liquid assets for 2012. In the last section, we show how the distribution can be adapted to be consistent with the Financial Accounts' aggregate values for recent years.

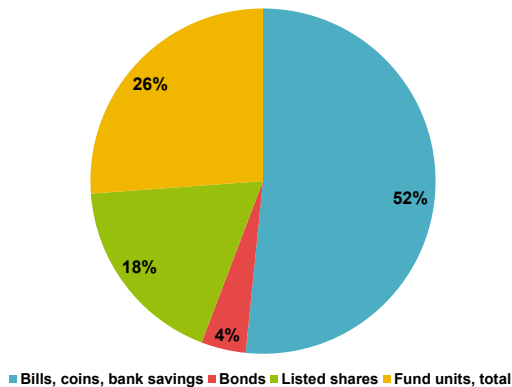
IMPUTING OF ASSETS FOR 2012

In addition to imputing deposits from Income Statement Data 20, we impute other liquid financial assets from the following income statement data:

- Directly owned bonds in a custodian account (Income Statement Data 21)
- Investment savings account (Income Statement Data 30)
- Directly owned shares in a custodian account (Income Statement Data 31)
- Fund units in a custodian account (Income Statement Data 41)

Diagram B7. Liquid assets' share in Financial Accounts in 2012.

Per cent

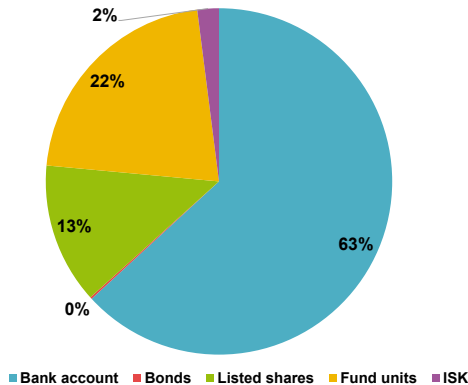


Source: Statistics Sweden.

Note: Total amounts to SEK 2,614 billion.

Diagram B8. Liquid assets' imputed share in 2012.

Per cent



Source: Statistics Sweden.

Note: Total amounts to SEK 2,140 billion.

Ange diagramrubrik

Ange enhet

Klistra in ditt diagram här

Source: Ange källa

Note: Ange anmärkning

Below we describe how the positions are imputed and compare them to aggregate values from the Financial Accounts.

Deposits

Just like in 2007, we assume that interest income in Income Statement Data 20 has been generated by 87.4 per cent of the aggregate. We distribute the remainder, 12.6 per cent, evenly. This results in just under SEK 39,000 per household. Once again, this is a conservative assumption for analysis of households' vulnerability.

Directly owned shares and bonds in custodian accounts

In the income statement data, we can observe distributions of directly owned shares (Income Statement Data 31) and coupons from bonds (Income Statement Data 21) in custodian accounts. Dividends and coupons are reported per ISIN.²⁰ We impute the values for these holdings via data on direct returns per ISIN that are available in the finance database EIKON.²¹ Based on our matching with ISIN, we find that 27 per cent of the households own shares that pay a dividend while only 0.4 per cent of the households own bonds that give coupons. Since not all securities pay a dividend or coupon, our values are lower than the actual figures – see below for a comparison to the Financial Accounts.

Investment savings accounts and fund units in custodian accounts

The income statement data also shows standardised income for holdings in investment savings accounts (ISK, Income Statement Data 30) and for holdings of fund units in custodian accounts (Income Statement Data 41). Standardised income for ISK is reported four times a year. We sum the income during the year and calculate the holdings in ISK as

$$(B1.5) \quad I_{it}^{ISK} = \zeta_{it}^{ISK} a_{it}^{ISK},$$

where ζ^{ISK} and a^{ISK} are the standardised percentage and the value of the ISA, respectively. The standardised income on the ISK differs from year to year. In 2012, it was 1.65 per cent. The ISK was at that time still a new way to acquire securities and only 4.1 per cent of households have holdings in an ISA.

The value of fund units in custodian accounts is calculated correspondingly. The standard for fund units is 0.4 per cent. According to the income statement data, 55.7 per cent of households had fund holdings in custodian accounts in 2012.

Comparisons to Financial Accounts

We compare aggregate imputed values with the positions in the Financial Accounts. Deposits in a bank account is the only item that has a direct equivalent in the Financial Accounts (FA2 "Bills and coins, deposits"). Thanks to the imputing method, the aggregate value for deposits is exact. For other liquid assets, we compare the sum of the imputed aggregate values to three items in the Financial Accounts: Bonds (FA3200), Listed shares (FA51110), and Fund units, total (FA5200). Deposits and other financial assets total SEK 2,614 billion in the Financial Accounts. Our imputed values total SEK 2,140

²⁰ ISIN is a code that is used to identify a security. The code is unique.

²¹ In EIKON, the variables are called *interest yield* and *dividend yield*.

billion. Listed shares, funds and bonds amount to SEK 1,265 billion in the Financial Accounts but only SEK 788 billion in our imputed values (see Diagram B7 and Diagram B8, respectively). In order to achieve a distribution that is consistent with the aggregate in the Financial Accounts, we therefore multiply each household's holdings of other financial assets by 1.613.

Appendix 2. Construction of balance sheets and future analyses

BALANCE SHEETS

Simultaneous distribution based on observable variable

The method for constructing balance sheets in other data sets is dependent on some household characteristics being observable in both data sets. This can be, for example, age, disposable income, and interest expenses. For different combination of the values for these variables, we create a conditional cross-sectional distribution for variables that are only observable in register data.

Conditional distributions

The size of financial assets differs per individual. There are systematic differences, for example based on age, disposable income and interest expenses. There are differences that observable characteristics cannot explain.

By creating conditional distributions, our method handles both types of variations. The steps are as follows:

1. We categorise households based on variables that are in both data sets, for example age group, decile of disposable income and decile of interest expense. We create seven age groups (the youngest is 20-29 and the oldest is 80+), which means that we categorise households in 700 ($7 \cdot 10 \cdot 10$) groups. Depending on the information available in both data sets and that is judged to be important, other variables can be selected or added to the above. For example interest income from bank deposits. If another data set contains information about income from bank deposits, deciles for interest income can be calculated, and the categorisation of households could, for example, consist of 7,000 groups. In this case, the conditional distributions of other financial assets are of particular interest.
2. For one variable, y , that is in the register data but not in the other data, we can now calculate the following:
 - a. Y : the value of y in aggregate (e.g., in the Financial Accounts).
 - b. w_g : group g 's weight of y in aggregate.
 - c. $f(y|g)$ or $h(\ln(y)|g)$: cross-sectional distribution of y in group g , of the cross-sectional distribution of natural logarithms of y in group g , $h(\ln(y)|g)$. In conjunction with this FI Analysis, we have estimated the moments for log-normal distributions of imputed deposits and other liquid financial assets, i.e., 700 distributions of each variable.
3. Based on these distributions, it is possible to create values randomly for each household in the other dataset that does not have information about y , based on the group to which the household belongs. The following applies for this simulation:
 - a. $\ln(\hat{y}_i) \sim h(\ln(y)|g_i)$ where g_i is the group to which Household i belongs.

- b. $\sum_{i=1}^{N_g} e^{\ln(\hat{y}_i)} = w_g \cdot Y$ is the aggregate value of y in group g . This is a normalization that makes the simulation consistent with the values in the aggregate.
4. If the cross-sectional distribution is based on data from year t , and data in the other dataset is from year $t + k$, the values for each household can be adjusted to be consistent with the aggregate in this year. The adjusted value is $\tilde{y}_i = \frac{Y_{t+k}}{Y_t} e^{\ln(\hat{y}_i)}$.

The construction of balance sheets for individual households in other datasets is beyond this FI Analysis. But this method gives FI the possibility of conducting in-depth analyses in the future, for example calculating net loan-to-income ratios (loans minus liquid savings divided by income) and net loan-to-value ratios (loans minus liquid savings divided by value of the home). In addition, the method makes it possible to calculate how many days a household should be able to live on its liquid savings if their financial circumstances would require this. Balance sheets are also the basis for consumption analyses, for example calculating how much households will reduce their consumption if negative economic events were to occur.

FUTURE ANALYSES

In this FI analysis, we have created distributions of households' liquid assets. We also broke these distributions down by household income, age, and size of the interest payment. In this way, we can estimate so-called conditional distributions for groups where we divide the households based on these three variables at the same time.²² We can calculate statistical measures as a percentage without savings, average and standard deviation for each of these groups. The measures can then be used together with an assumption of a statistical distribution that is applied to other datasets that FI has.²³

Two examples are FI's annual mortgage survey and its survey of consumer credit, which contains information about new borrowers. Since there is information about age and income and diverse data on loans and interest rates, each borrower in the survey can be matched to a specific conditional distribution.²⁴ This means that we can draw assets randomly from our conditional distributions for borrowers to create balance sheets that correspond to the households'. FI's data should thus contain information about both liquid assets and liabilities for new borrowers, which enables new analyses.

Stress tests

FI conducts stress tests of new borrowers every year (see Finansinspektionen, 2020a, and Finansinspektionen, 2020b). The stress tests consist of loss of income and higher interest rates. These tests, together with information about liquid financial assets, can be expanded to analyse how long borrowers can live on their savings before they experience a deficit in their monthly budget.

²² Given the seven age groups we use in this analysis and income and interest payment deciles, we get 7,000 groups.

²³ The distribution needs to be limited to larger than or equal to zero, for example the log-normal distribution.

²⁴ In some cases, there is no information about existing loans, but this information can be generated as in Andersson and Förster (2020).

In stress tests, it is important to keep separate liquid assets with stable values from those that can decrease in value. If and how much certain assets decrease in value is dependent on the underlying shock in the stress test. We can break down savings into liquid assets with stable value – which do not decrease following an economic shock – and assets that decrease in value if a shock occurs.²⁵

Assets contribute with important information in stress tests since households with assets can live (temporarily or permanently) on a combination of income and savings. This is probably of particularly importance given unemployment.

Reduced consumption

Since this FI Analysis gives FI the possibility of creating balance sheets for borrowers, our method, together with assumptions on the distribution between consumption and savings, makes it possible to study reduced consumption following a shock. And given certain assumption, it will then be possible to calculate the impact on GDP and public finances.

Vulnerability analysis

Our method makes it possible to calculate borrowers' vulnerabilities in new ways. One such way is to measure how many months a borrower can maintain their consumption or avoid a deficit during weaker financial circumstances. Our method also makes it possible to calculate net loan-to-value ratios – loans minus assets divided by the value of the home – and net loan-to-income ratios – loans minus assets divided by income. These two measures provide a more comprehensive overview of borrowers' vulnerabilities than loan-to-value ratios and loan-to-income ratios.

²⁵ How some assets lose value depends on the shock. For example, unemployment in and of itself does not mean that the value of shares will fall. But if unemployment is due to an economic recession, it is reasonable to assume that the value of shares will fall.