

# Swedish households' indebtedness and ability to pay: a household level study<sup>1</sup>

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## 1. Introduction

Household borrowing has increased considerably in a number of developed countries over the past two decades; both in absolute terms and relative to household income (see Debelle (2004) and CGFS (2006)). The increase in household indebtedness can be attributed to a number of factors, and structural differences between countries might help to explain why households in some countries have increased their indebtedness more than households in other countries. Two important factors behind the increased indebtedness in developed countries are probably: the financial deregulation of the early 1980s, which decreased the level of credit rationing, and the lower levels of interest rates, both in nominal and real terms. At present, the aggregate household debt ratio (household debt as a share of disposable income) in Sweden stands close to 140 per cent, which is roughly double the figure for 1970. The Swedish credit markets were deregulated in the mid 1980s, and the deregulation was followed by a rapid increase in household debt (see Figure 1). The dismal macroeconomic history of Sweden in the early 1990s is well known, and came about when the onset of a global economic slowdown coincided with both an ultimately futile defence of the Swedish Krona, and a major overhaul of the tax code<sup>3</sup>. The ensuing sharp rise in interest expenditures placed an excessive burden on the households, who responded by sharply cutting back on their borrowing. During the next years, the debt-to-income ratio fell to levels well below the period of the credit deregulation (see Figure 1). In the mid 1990s, the debt burden of Swedish households began to rise again, and this increase has been sustained up until this date, with debt ratios returning to the levels seen just before the banking crisis in the beginning of the 1990s (see Figure 1). Although the debt ratios are almost the same now as then, there are a number of important differences between the situation today and the early 1990s. This is evident in the evolution of the interest ratio (interest rate expenditures as a share of disposable income). While this share was rising during the build-up of household debt in the 1980s, it has constantly been falling the last ten years, and is now near a historic low (see Figure 1). Nonetheless, the increase in indebtedness has raised concerns about the sustainability of household debt, the vulnerability of the household sector and possible implications for the stability of the financial system and credit losses in banks. The purpose of this article is to study the indebtedness and ability to pay of individual indebted households, in order to see if there is a risk of "over-borrowing" and potential significant credit losses in the banking sector. Furthermore, we also study what effect macroeconomic shocks, i.e. higher interest rates and increased level of unemployment have on the indebted households' ability to pay.

The situation in recent years has not only raised questions of what the sharp expansion in credit could entail for the vulnerability of the household sector and the banking sector, but

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<sup>1</sup> The views in this paper are solely the responsibility of the authors, and do not necessarily reflect the views of the Executive Board of Sveriges Riksbank.

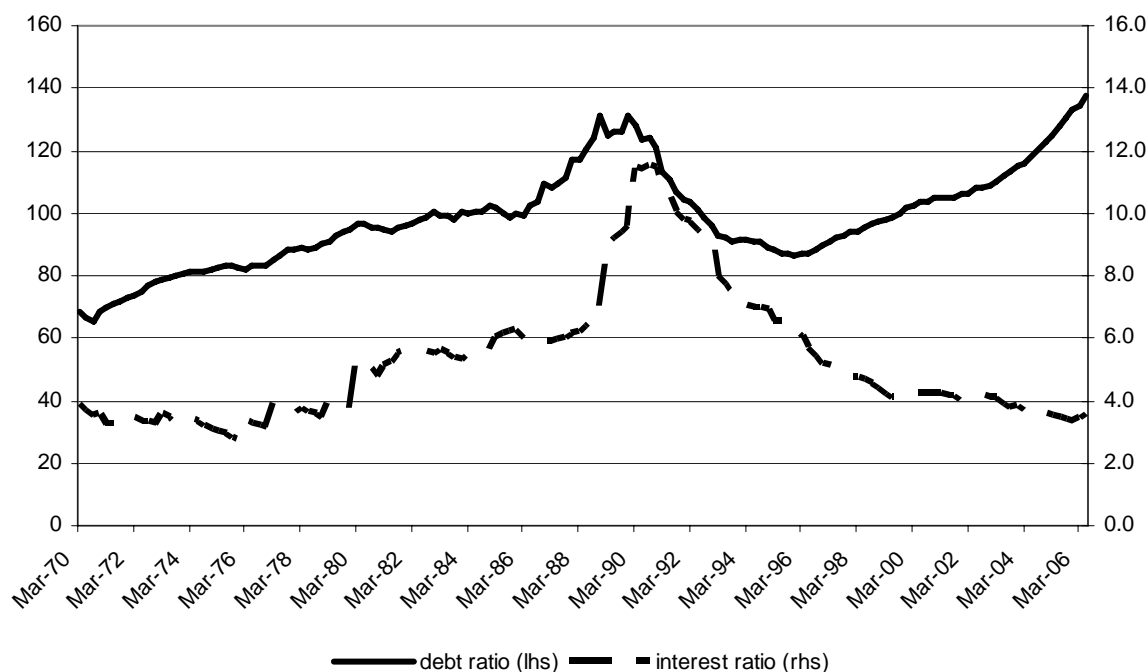
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<sup>3</sup> For an excellent account of the Swedish banking crisis in the early 1990s, see Englund (1999).

also how the domestic macroeconomic environment could be affected if this development was discontinued. However, this article focuses on the direct stability aspects of the debt situation and leaves any effects on the general macro economy open. The analysis has been performed on wealth and income data from Statistics Sweden for Swedish households in 2004; the most recent data available.

Figure 1

**Household debt and (post-tax) interest rate expenditures as share of disposable income (per cent)**



Sources: Statistics Sweden and the Riksbank.

In Section 2, we present the data used in the analysis. This is followed by a bird's eye view on the distribution of income, assets, liabilities and ability to pay within the Swedish household sector in Section 3. In Section 4, we stress the balance sheet of the household sector, with regard to changes in the interest rate and unemployment rate. We also estimate the households' vulnerability at present, their indebtedness and ability to pay, given the recent changes in interest rates, disposable income and indebtedness at the aggregate level. Finally, in Section 5, we provide summary and concluding remarks.

## 2. The data set

As mentioned in the introduction, the increase in indebtedness has raised concerns about potential effects on the stability of the financial system, if interest rates or unemployment were to rise. These are vital questions, but answering them using aggregate data from the financial- and national accounts, will prove difficult, if not impossible. Aggregate data on income do not differentiate between the income of indebted and non-indebted households, where the latter are irrelevant for analysing potential credit losses. Moreover, aggregate data tell us nothing about the distribution of debt, interest rate expenditures and income. Hence it

is possible that pockets of vulnerabilities are masked by the financially sound segments of the household sector. Given these limitations, the Riksbank has increasingly turned to micro data, more specifically to the HEK-survey, for analysing the balance sheet of the household sector. The HEK-survey, which is compiled by Statistics Sweden (SCB), is a detailed annual survey of the household sector with data on income, debt and wealth. The survey is based on administrative register information, collected from government bodies responsible for income transfers and taxation. Furthermore, approximately half of the participating households are selected for interviews. Each household in the survey is prescribed with a population weight, which corresponds to the number of households in the population that each household represents. This gives the possibility of aggregating the micro data, in order to compare with data from either the national- or financial accounts. The survey has also been used for more academic purposes; see for example Andersson (2001), Bergmark and Palme (2003), Klevmarken (2003) and Flood et al (2004).

The number of households in the survey varies depending on the way a household is defined. A household can either be defined as two adults living together (or one adult living alone), with children below the age of 18, or, basically, as the individuals living under one roof. Using the first definition of a household, the number of participating households number about 20,000. Using the second definition, the number of households are about 17,000. Hence, obviously, the latter definition is more inclusive in its definition of a household. For example, a grown-up child living with his, or her, parents, would count as a separate household using the first definition, but would be included with the parents' household using the second definition.

It is not immediately clear which definition should be used. An example will hopefully clarify the choice at hand. In general, there is a return-to-scale effect of individuals living together with regard to living costs. Thus, for example, a 20 year-old male living with his parents may look financially constrained, until one takes into account that his parents are paying for at least some of his running costs. This would suggest that the more inclusive household definition should be used, as it more accurately depicts the conditions "on the ground". However, while his parents may help out with his daily running costs, it does not follow that his parents would bail him out if he took on debt and was unable to fulfil his debt obligations. Hence, since the focal point of exercise is credit losses, the Riksbank works with the first, less inclusive definition. In our example, this would mean that our 20-year old male is counted as single household, although he is living with his parents. However, one should not overstate the consequence of which household definition is used. The majority of the households look the same, regardless of which definition is used. This is particularly true for the households in the higher income echelons, where, as we shall see, most of the debt in the household sector is concentrated.

While the survey gives a detailed insight into the economy of the household sector, it suffers from publication lags. Statistics Sweden calculates a preliminary version of the survey about 15 months after the end of a year which does not include any data on household wealth. The final version of the survey is released a few months later and contains data on the households' wealth, in addition to altering the sample from the preliminary survey to better match the population. As the final version of the survey is released quite close to the preliminary version, the preliminary is only used when the Riksbank's Financial Stability Report is published in the window between the publication of the preliminary and final version of the survey.

Another obvious limitation is that the survey only includes assets, liabilities and income that are reported to the authorities. In practice, this means that the survey underestimates the households' disposable income, due to wages from the informal sector. It is also likely that the sizes of the assets are underestimated, due to offshore investments that are not properly reported to the tax authorities. On the other hand, there is no incentive to underreport debts, partly because the interest rate expenditures are tax deductible, but also because a reported lower net wealth means a lower (or zero) wealth tax. Moreover, real assets are basically defined as real estate, ignoring assets such as jewellery, mink furs, and cars.

Table 1

**Income, assets and liabilities of indebted households in 2004**

Mean values in thousands of SEK

income category	1	2	3	4	5
Disposable income	78	133	192	288	467
Financial wealth	53	68	105	240	516
Real wealth	317	324	491	911	1843
Debt	177	155	255	450	901
Debt ratio (per cent)	185	117	133	156	193
Interest ratio (per cent)	3.9	3.4	4.2	4.9	5.7
Assets-to-liabilities (per cent)	283	290	265	273	278
Included households (per cent)	18	44	61	82	93

Note 1: 1 SEK corresponds to 0.11 Euro, or USD 0.13.

Note 2: The definition of household debt excludes study loans.

Note 3: The debt (interest) ratio is defined as household debt (interest expenditures) divided by household disposable income.

Note 4: The last row in Table 1 shows the share of households for each income category that are included in the analysis (i.e. are indebted and have a disposable income larger than zero).

Sources: Statistics Sweden and the Riksbank.

### 3. Debt, income, wealth and the ability to pay in the Swedish household sector

To analyse the distribution of debt, income, wealth and ability to pay, the household sector is divided into five equally large categories, according to their level of disposable income. The ultimate purpose of the analysis is to find pockets of vulnerability, which, under stress, may translate into credit losses in the banking sector. Households that do not hold any debt, and hence are unable to cause any credit losses, are excluded from the analysis, unless otherwise stated. Thus we only study the indebted households within each income category<sup>4</sup>. Descriptive statistics for the five income categories can be found in Table 1. As can be discerned from Table 1, high disposable income, high indebtedness and large assets tend to go hand in hand. Note that since we only study indebted households, the number of included households varies between the income categories. In the first category, only 18 percent of the households hold debt and have positive disposable income. This share rises as we traverse across the income categories and in the last income category 93 per cent of the

<sup>4</sup> Apart from excluding non-debt holding households, we also exclude households with a negative disposable income. A household can, for example, have a negative disposable income if it earns zero (or close to zero) income on labour and/or capital, while it at the same time pays property tax or wealth tax.

households hold debt. It is also instructive to compare the debt ratios and interest ratios in Table 1, with those calculated from aggregate data (see Figure 1). While the aggregate debt ratio in 2004 hovers just above 120 per cent, the debt ratio for the highest income category is in excess of 190 per cent. The household sector also seems to have sufficient collateral to back their liabilities, as can be seen from the “assets-to-liabilities” row in Table 1. All income categories have, on average, assets worth more than twice the value of their liabilities<sup>5</sup>.

A more thorough investigation of the data set shows that the differences can be quite large within the individual income categories as well. The most heterogeneous group is category 1. This group is difficult to distinguish, since it consists of individuals with very different characteristics and life situations. The statistics show that a major part of these households do not have employment, income, assets or liabilities. Moreover, as can be seen from Table 1, the mean disposable income in the first income category is quite low, and many households would find it hard to make sustenance on such incomes. Hence, there is reason to be sceptical towards the quality of the data in the lowest income category.

### **Distribution of assets and liabilities**

In total, assets constitute about 276 per cent of the value of total liabilities, but the distribution is highly skewed towards the top income earners (see Figure 2). The bars in Figure 2 should be interpreted as follows: Indebted households in the highest income category (i.e. the indebted households of the 20 percent households with the highest disposable income) hold 57 per cent of the total debt in the household sector (chequered bar). However, the same households also hold 35 per cent and 49 per cent of the financial and real assets, respectively (black and white bars). The reader should be aware, that while the debt shares for all income categories sum to 100 per cent, the shares of financial and real assets in Figure 2 do not sum to 100 per cent, as some of the assets are held by households that are not indebted. In total, the indebted households hold 86 percent of the real assets, compared to only 57 per cent of the financial assets. The fact that indebted households hold a larger portion of the real wealth, compared to the financial wealth, is not very surprising, since the majority of the household debt has been used to accumulate real assets (i.e. houses and owner-occupied flats). Furthermore, comparisons with earlier years show that the distribution of assets and liabilities across the income categories is stable over time.

### **Households' ability to pay**

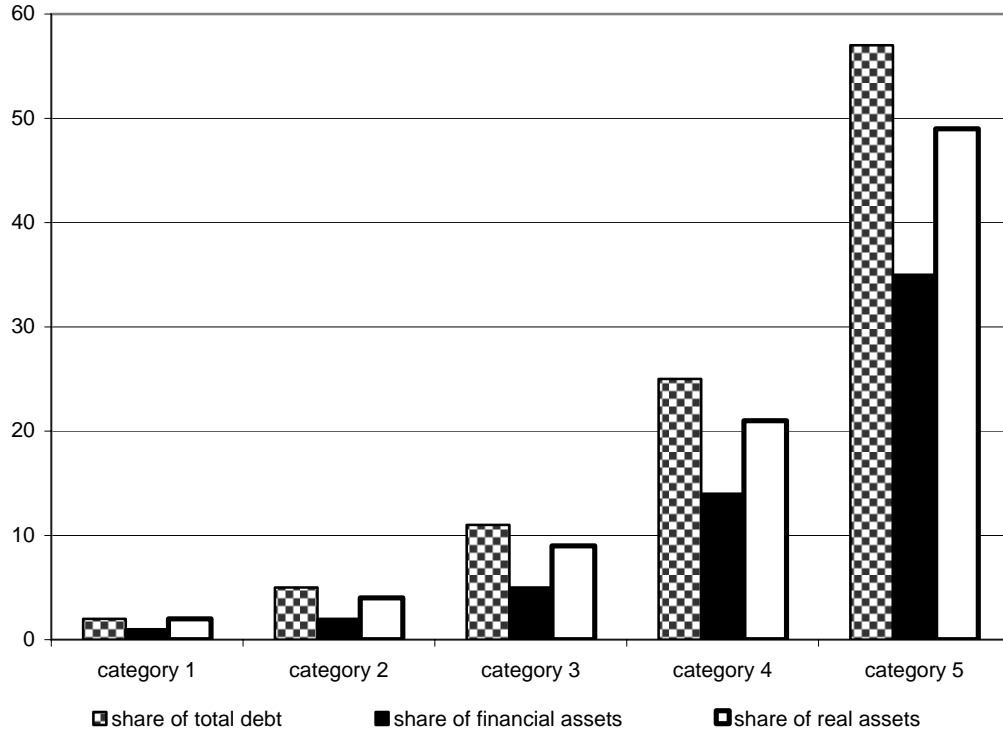
An indebted household can service its debts in two ways, either by using its disposable income, or by capital gains from selling off assets. In the longer run, most households would find it hard to service its debts from capital gains, so this way is presumably used as a last-ditch effort to avoid default. Unlike real assets, financial assets are relatively easy to realise, and can therefore serve as a short-term buffer against unexpected, temporary, drops in disposable income. Nonetheless, under normal circumstances, households use their disposable income to service their debts, and therefore, a study of the households' ability to pay also requires some idea of how large a proportion of the income that is dedicated to interest expenditures, and how much income a household has left after it has serviced its debts. As was shown in Table 1, households with high income, in general, have both a higher interest ratio and debt ratio.

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<sup>5</sup> Total assets include households' financial assets including insurance saving, and the market value of owner-occupied and tenant-owned dwellings and secondary dwellings. Other items are rental property, agricultural property and other property including building sites. Assets also include a small item called “other assets”.

Figure 2

**Indebted households' share of assets and liabilities held in 2004 by income category (per cent)**



Sources: Statistics Sweden and the Riksbank.

In order to get an idea of households' vulnerability to changes in income or expenditure, the economic margin of household  $j$ ,  $M_j$ , is calculated:

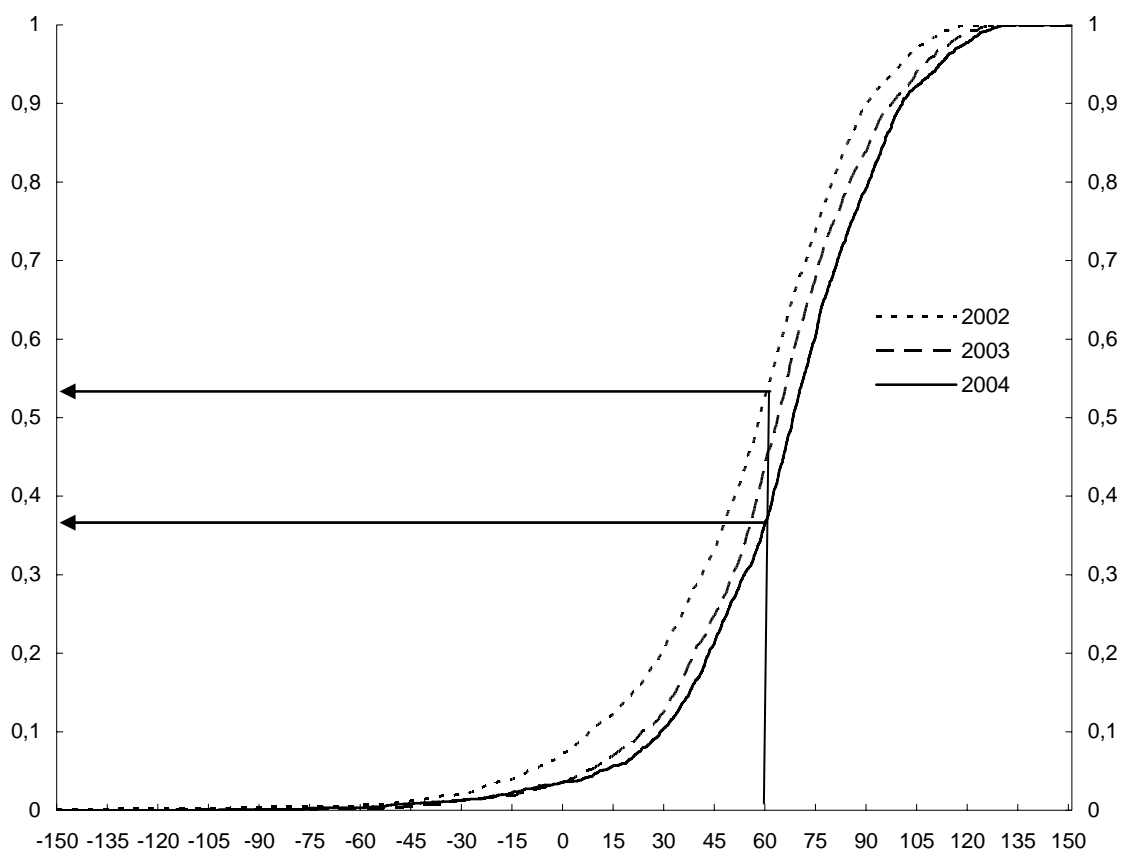
$$M_j = Y_j - iD_j - RC_j$$

where  $Y_j$  is the household's disposable income,  $iD_j$  is the interest expenditure and  $RC_j$  are other running costs. The margins thus measure how much income each household has left, after it has serviced its debts, and paid for the necessary living costs. If a household has a margin less than zero, this would mean that it would find it hard to make ends meet, and might therefore default on its debts. In our analysis, we assume that the probability that household  $j$  defaults on its debts ( $p_j^D$ ), is one if the margin is less than zero. On the other hand, if the margin is larger than (or equal to) zero the household will not default on its debts.

The living costs,  $RC_j$ , consist of two components. The first component is what roughly can be described as day-to-day expenses, such as clothes and food. Statistics Sweden calculates how much each household needs as a minimum to cover such costs, where care is taken of the household's size and composition. The second component is non-interest housing costs, such as electricity and rent. Unfortunately, there is no information on these costs in the HEK-survey. However, Statistics Sweden publishes another (much smaller) expenditure survey, called the HUT-survey, which has information on such costs for each income decile. To estimate these non-interest housing costs for each household in the HEK-survey, we map these expenditures from the HUT-survey to the HEK-survey, i.e. the top ten percent earners in the HEK all get the same costs as the mean of the top ten percent earners in the expenditure survey. Nonetheless, the running costs are by all likelihood somewhat

underestimated, both with regard to their mean and variance. For example, we have no information on the cost of child care. Moreover, individuals who work need to transport themselves to and from work twice a day. This can either be very cheap (walking) or expensive (car). The analysis of the ability to pay also becomes somewhat simplified because, in reality, it can be more difficult for a household to realise its assets (especially real assets) or to adapt to lower running costs.

Figure 3  
**Cumulative distribution of household margins for income category 3 (thousands of SEK and per cent)**



Sources: Statistics Sweden and the Riksbank.

A convenient way to illustrate the distribution of the households' ability to pay is to calculate the cumulative distribution of the margins for each income category, which looks like an S-shaped curve (see Figure 3). This gives an indication of how many households, in each income category, that are below margin and how close the other households are to the margin. In Figure 3 we plot the cumulative distribution of the households' margin for income category 3 for the years 2002, 2003 and 2004<sup>6</sup>. Figure 3 should be interpreted as follows: in 2002, about 53 per cent of the households in income category 3 had an annual margin of 60 000 SEK or less. In 2004, this share had decreased to 37 per cent. Thus, the households in income category 3 have significantly strengthened their financial position between 2002

<sup>6</sup> The households' margins for 2002 and 2003 are calculated from earlier versions of the HEK-survey.

and 2004. By moving the vertical line (the one stuck at 60 000 SEK in Figure 3) to the left and right, one quickly gets an idea of how sensitive the households in each income category are to changing income or increasing costs.

However, as the ultimate purpose of the study is to monitor potential credit losses in the banking sector, it does not suffice to just calculate the proportion of households that lie below margin, without taking into account their share of the total debt of the household sector, and the value of the assets that can be used to cover losses incurred by a default. Hence, we calculate two measures, the “Exposure at Default” (EAD), which measures the share of total household debt held by households with a margin less than zero, and the “Loss Given Default” (LGD), which measures the share of debt, held by households with a margin less than zero, that is not covered by the households’ financial or real assets. More specifically, we calculate our LGD’s as follows: if a household defaults on its debts (i.e. the margin of the household is less than zero), the creditors stand to lose the negative value of the net wealth,  $NW_j$ , of the household, if the net wealth is negative. For example, if a household defaults on its debts, and it has assets and liabilities worth 8 000 SEK and 10 000 SEK, respectively, the creditor will suffer a credit loss equal to  $-(8\,000 - 10\,000)$  SEK = 2 000 SEK. If the net wealth is greater than (or equal to zero) the default will not incur any credit loss on the creditors as the debts are fully covered by the assets. In the example above, if the defaulting household had assets worth 12 000 SEK, the creditor would not suffer any credit losses, as the value of the assets covers the liabilities by a margin of 2 000 SEK. To calculate the projected credit loss incurred by each household, we multiply  $p_j^D$  (which is either 1 or 0) with  $L_j$  (which is equal to the negative value of the net wealth, if the net wealth is negative). The credit losses can then be summed together, either within income categories, or across the entire population. The LGD’s are then defined as aggregate projected credit losses divided by the outstanding stock of household debt.

Formally:

$$p_j^D = \begin{cases} 1 & \text{if } M_j < 0 \\ 0 & \text{otherwise} \end{cases}$$

$$L_j = \begin{cases} -NW_j & \text{if } NW_j < 0 \\ 0 & \text{otherwise} \end{cases}$$

$$LGD = \frac{\sum_j (p_j^D \times L_j)}{\text{total household debt}}$$

It is worthwhile to stress that our LGD’s need *not* be identical to those calculated by the banks. Our measure should be viewed as a risk metric, that we are able to construct, given the data available to us, and not as an attempt replicate the LGD’s in the banks’ loan books.

In Table 2, we calculate some statistics on the proportion of households with negative margins, EAD’s, and LGD’s within each income category. Table 2 should be interpreted as follows: the second column lists the proportion of indebted households that lie below margin per income category; these households are also called “vulnerable” households. The next column shows the vulnerable households’ share of total household debt. The last column shows the debts, held by vulnerable households in each category, that are not covered by assets, as a share of total household debt. For example, in income category 2, 6.4 per cent of all indebted households have a margin that is less than zero. These 6.4 per cent, in turn, hold 1.2 per cent of all household debt. If these households were to default on their debts, their assets would be claimed by the creditors. The debt, held by the defaulting households that would not be covered by the assets, amount to 0.14 per cent of the total debts held by the household sector. If one repeats the exercise for all the indebted households, one arrives at the following conclusion: 6.3 percent of all the indebted households in the survey have negative margins and thus, at least technically, run a risk of cancelling their debt servicing.



Together, these households hold 5.6 per cent of the total household debt. If they were to default on their debts, the creditors would suffer losses corresponding to 0.9 per cent of total household debts. This figure is substantially higher than actual credit losses, as reported by the banks. Although some the lending to the households is channelled through other creditors, where credit losses presumably are higher than in banks and mortgage institutes, one can not abstract from the fact that projected credit losses of 0.9 per cent seem too high. In practice, this means, that according to the survey, the households would default more frequently on their debts, than they actually do<sup>7</sup>. One may also note that more than half of the credit losses stem from the lowest income category, even though this category only holds 2 per cent of total household debt (see Figure 2). This supports the suspicion aired earlier, that the households, especially in the first income category, have incomes and assets that are not recorded in the survey.

Table 2  
**Vulnerable households, EAD and LGD**  
(per cent)

Income category	Share of households below margin in each income category	EAD (as share of total debt)	LGD (as share of total debt)
Income category 1	64.2	1.8	0.49
Income category 2	6.4	1.2	0.14
Income category 3	2.8	1.4	0.09
Income category 4	0.5	0.6	0.04
Income category 5	0.1	0.7	0.11
All income categories	6.3	5.6	0.9

Sources: Statistics Sweden and the Riksbank.

#### 4. Stress testing the household sector

In the event of a marked deterioration in the ability to pay, due for example to higher interest rates or increased unemployment, some households could encounter difficulties in servicing their debt, and banks' credit risks would mount. While the cumulative distribution of the margins, presented in the previous section, are useful for visualising the margins, they are not really useful for stress testing, unless we translate hypothetical macroeconomic outcomes into shifts in the share of vulnerable households, EAD and LGD. This section presents partial arithmetic examples that show how the ability to pay and risk of loan losses are affected by a rise in the interest rate and unemployment. The ability to pay is tested with the assumption that the interest rate is raised by 1-3 percentage points, and that unemployment increases by 1-3 percentage points. The effects that are studied, are the change in the proportion of vulnerable households, the impact on banks' exposure to this group (i.e. the EAD) and the projected LGD's. How the proportion of vulnerable households changes, after deterioration in their finances indicate their sensitivity. The fraction of the

<sup>7</sup> At the height of the banking crisis in Sweden, the banks suffered credit losses on their household lending, corresponding to 0.7 per cent of the outstanding household debt.

households' total loans that can be attributed to these vulnerable households can be seen as a measure of the increased credit risk in lending, and the LGD as a measure of how severe the credit losses would be, if the vulnerable households indeed defaulted. It should be pointed out that these partial calculations do not take account of stylized business cycle effects. Normally, interest rates rise in conjunction with more robust economic activity. Such conditions are also accompanied by stronger household income, but this has not been included in these calculations as income is held constant.

### Effects of rising interest rates

How sensitive the households are to changes in the interest rate depends on the fixed-rate terms of their loans. Households with variable-rate loans are affected immediately by a change in rates, while for fixed-rate loans, the effect is only felt when the loans are renegotiated. In the following calculations, the short-term effects are studied first, given the fixed-rate terms that the Swedish households have on their loans<sup>8</sup>. This is followed by an analysis of the long-term effects that arise when the change in the interest rate affects the entire debt stock. All the loans are assumed at that stage to have been renegotiated at the new higher rate.

Table 3  
Effects of rising interest rates  
(per cent)

Increase in interest rate (p.p)	0	1	2	3
Households below margin in each income category	6.3	6.4 (6.6)	6.6 (7.1)	6.7 (7.3)
EAD	5.6	5.8 (6.8)	6.5 (8.2)	7.2 (9.2)
LGD	0.9	0.9 (1.1)	1.0 (1.3)	1.1 (1.4)
Interest ratio	5.1	5.4 (5.9)	5.7 (6.7)	6.1 (7.6)

*Note:* The estimates outside the parentheses denote the immediate effect of an interest rate hike, where only the loans with adjustable interest rates are affected. The estimates inside the parentheses denote the long-term effect where the entire debt stock is renegotiated at the higher interest rate.

Sources: Statistics Sweden and the Riksbank.

The second column of Table 3 shows the effect of a zero rise in the interest rate, which of course, only reproduces the results from Table 2. A rise of 1 percentage point in the general level of interest rates would result in an increase in the households' average interest ratio from 5.1 to 5.4 per cent in the short term. In the long-run, when all loans have been renegotiated at the new, higher, level of interest, the interest ratio rises to 5.9 per cent. The proportion of households below the margin is largely unchanged (from 6.3 per cent to 6.4 per cent in the short-run and 6.6 per cent in the long-run). The LGD (i.e the debts of the vulnerable households, that are not covered by assets) are also essentially unaffected. Thus, the credit risk in household lending is almost insensitive to a 1 percentage point increase in

<sup>8</sup> About 60 per cent of the loans in stock of household debt are fixed rate loans.

the interest rate. At the other extreme, if the interest rates instead rise by 3 percentage points, the average interest ratio would increase to 6.1 per cent in the short run, and 7.6 per cent in the long-run. But nor does the sharper rise in interest rates affect the proportion of households below the margin to any great extent (6.7 per cent and 7.3 per cent, in the short- and long-run, respectively). The EAD increases somewhat more (7.2 per cent and 9.2 per cent, in the short- and long-run, respectively) and the LGD increases to 1.1 per cent in the short-run and 1.4 per cent in the long-run.

The important question is, of course, if one should be alarmed by the projected LGD, following an interest rate hike of 3 percentage points. The answer to this question is, by all likelihood, no. First of all, during the banking crisis in the early 1990s, the losses on household lending amounted to 0,7 per cent of total household lending. These losses never posed any severe problems for the banking sector (losses on commercial property did, however). Secondly, while our projected LGD amounts to 1.1 and 1.4 per cent (in the short- and long-run), they grossly overstate actual LGD (see the previous section). Hence, if the interest rate was to rise by 3 percentage points, the actual LGD would be far lower than our projected LGD. Hence, it is not likely that a three percentage point increase in the interest rate would entail any significant problems for the banks in the form of credit losses.

### **Effects of rising unemployment**

In the event of unemployment an individual suffers a loss of income equivalent to the difference between its previous wage and the unemployment benefit it receives from *arbetslöshetskassan*. Could an increase in unemployment affect the banks' credit losses in a way that would give cause for concern? We employ a Monte Carlo approach and simulate the effects of unemployment among the employed individuals, where all individuals in a household with employment run the risk of becoming unemployed. After a simulated increase in the level of unemployment, the disposable income, given the present rules for unemployment benefits, and all other statistics are recalculated. The simulations are repeated 1 000 times for each level of aggregate unemployment. In these calculations, all gainfully employed persons have been assigned an equally large probability of becoming unemployed. In reality, those running the highest risk of becoming unemployed in an economic downturn, are those who recently joined the labour market (i.e. youths, immigrants and previously unemployed). As these individuals in general have not accumulated any substantial amounts of debt, the implied effect on the banks credit losses from an increase in unemployment is likely to be overestimated.

The results from the simulation can be seen from Table 4, which is constructed in an identical manner to Table 3. Following an increase in the unemployment rate by three percentage points, the proportion of vulnerable households rises from 6.3 to 6.7 per cent, while the EAD at the same time increases from 5.6 to 6.3 per cent. More importantly, however, is that the LGD is essentially unchanged, even in the face of a 3 percentage point rise in unemployment. That the interest ratio is not affected is partly because the interest rate is held constant in the calculations and partly because the decline in disposable income caused by the rise in unemployment is too small to make any impact on the ratio. The important lesson from comparing Table 3 and Table 4 is that the effects on the households' ability to pay are far less in the event of an increase in unemployment, than in the case of a rise in the interest rate. One explanation for this is the composition of the households' debt and income. Household debt is by and large concentrated to the highest income category. These households often consist of two employed adults, and hence the household has dual incomes. Thus, even if one individual in the household becomes unemployed, the other individual's income, together with the unemployment benefit, is usually enough to cover living costs and interest rate expenditures.

Table 4  
**Effects of rising unemployment**  
(per cent)

Increase in unemployment (p.p)	0	1	2	3
Households below margin in each income category	6.3	6.5	6.6	6.7
EAD	5.6	5.8	6.1	6.3
LGD	0.9	0.9	0.9	0.9
Interest ratio	5.1	5.1	5.1	5.2

*Note:* The estimates are the medians of the Monte Carlo replicates.

Sources: Statistics Sweden and the Riksbank.

### Falling asset prices and LGD's

Even if a household defaults on its loans, the creditors will still be able to recover a clear majority of debts from the household's assets, as is indicated in Table 3 and Table 4. However, the estimates in Table 3 and Table 4 are, of course, only strictly valid at the prevailing value of the real and financial assets (which conceptually translates into the existing residential property prices and share prices). In a situation of macroeconomic stress, it is likely that both the value of real and financial assets fall, and an asset-to-liability ratio, that might have been prudent in good times may no longer be enough. It would, obviously, be possible to calculate a very large number of combinations of a fall in wealth, rising unemployment and interest rate hikes, but it would be very hard to present the result to the reader without resorting to burdensome tables. From the preceding sections, it is clear that a rise in the interest rate posed a bigger threat to banks, w.r.t. credit losses, than a rise in unemployment. Thus, it seems reasonable to investigate the combined effect on the LGD of a sharp rise in the interest rate *and* a fall in the level of wealth.

Table 5  
**LGD and falling asset prices combined with  
a 3 per cent increase in interest rate**  
(per cent)

Remaining financial wealth → Remaining real wealth ↓	100 %	90 %	80 %	70 %
100 %	1.1 (1.4)	1.1 (1.5)	1.1 (1.5)	1.1 (1.5)
90 %	1.2 (1.6)	1.2 (1.6)	1.2 (1.6)	1.2 (1.6)
80 %	1.3 (1.7)	1.3 (1.7)	1.3 (1.8)	1.3 (1.8)
70 %	1.4 (1.9)	1.5 (2.0)	1.5 (2.0)	1.5 (2.0)

*Note:* The estimates outside the parentheses denote the immediate effect of an interest rate hike, where only the loans with adjustable interest rates are affected. The estimates inside the parentheses denote the long-term effect where the entire debt stock is renegotiated at the higher interest rate.

Sources: Statistics Sweden and the Riksbank.

Table 5 shows the combined effect of a 3 percentage point rise in the level of interest *and* an erosion in the level of real and financial wealth. Judging from Table 5, the LGD's are much more sensitive to changes in real wealth, than to changes in financial wealth. This is not very surprising, given the fact that real wealth constitutes nearly 80 percent of total household wealth. One question that has been put forward is, whether a sharp rise in the interest rate, combined with a fall in residential property prices, could put the banking sector under strain. The answer to this question, according to Table 5, is no. Suppose that, the interest rates were to rise by 3 percentage points. This would, *ceteris paribus*, at most, lead to a fall in house prices by 20 per cent, according to econometric estimates made by the Riksbank, see Financial Stability Report 2005:2. A fall in house prices by 20 per cent (which roughly would translate into a 20 per cent drop in real wealth) combined with a 3 per cent interest rate hike, would, according to Table 5, shift the LGD's from their present ratio of 0.9 per cent, to 1.3 per cent in the short-run and 1.7 per cent in the long-run. Hence, in the long-run credit losses from household lending would barely double. Given that present actual credit losses (as reported by banks) are close to zero, it would be hard to argue such a shift would put the banking sector under severe strain.

### Households' ability to pay 2005

So what is the current situation for individual households' ability to pay? Since 2004 households have continued to borrow at a high rate, and the value of real and financial assets has strengthened. To what extent has this influenced the proportion of vulnerable households, the EAD's and the LGD's of the population? To estimate this, we use aggregate data from the national- and financial accounts to, in effect, try to forecast what the HEK-survey will look like in 2005. This, of course, neglects the "micro aspects" of the data set, but if we abstract from these, and focus aggregate credit losses, the forecasts can still be of interest. In this case, we use aggregate data on interest payments, debt, disposable income, residential property prices, stock indices and inflation and map the evolution of these variables between 2004 and 2005 to each household in the survey, i.e. each and every household gets an equal increase (in percentage terms) in disposable income, debt, wealth, cost-of-living etc.

These calculations are shown in Table 6. As expected, the household sector, as a whole, has continued to strengthen its financial position during 2005. The proportion of vulnerable households has dropped to 5.7 per cent, the EAD has dropped to 5.2 per cent and the LGD has edged down 0.1 percentage point. Thus, if anything, the credit risk in lending to households has continued to fall since the end of 2004.

Table 6  
**Vulnerable households, EAD and LGD,**  
**all income categories**  
(per cent)

	Share of households below margin	EAD (as share of total debts)	LGD (as share of total debts)
2004	6.3	5.6	0.9
2005 (forecast)	5.7	5.2	0.8

Sources: Statistics Sweden and the Riksbank.

## **5. Summary and concluding remarks**

Household borrowing has increased considerably in the last years in Sweden, which has raised questions of what it entails for the vulnerability of the households and the banking sector. In this paper we studied the households' assets, liabilities and ability to pay, using Swedish micro data from 2004. One important conclusion is that the majority of the loans are attributable to households that have high incomes, and also account for the majority of real and financial assets. In fact, the 20 per cent top earners account for 57 per cent of the debts and 44 per cent of the total assets of the household sector. Only 0.1 per cent of these households were deemed to vulnerable in the sense that they would not have margins to cope with adverse changes to their balance sheets. The most vulnerable households, those that have no margins for unexpected expenses, are largely debt-free. We also stress tested the balance sheets of the households, where we subjected them to both mild and sharp increases in the interest rate and the level of unemployment. The lessons from these stress tests are that the household sector is much more sensitive to increases in the interest rate, as compared to changes in the level of unemployment. However, not even a sharp increase in the interest rate (such as an instant increase of 3 percentage points), combined with large falls in the value of the real assets of household sector, was deemed to be sufficient to generate credit losses in the banking sector large enough to pose a threat to the stability of the financial system. The high indebtedness, however, could give rise to problems for individual households. Even though household indebtedness at present is unlikely to inflict significant credit losses on the banking industry, it is clear that the situation that has prevailed during the last years, where debt has grown twice the rate of nominal income, is unsustainable in the longer run. This point was also made in the latest issue of the Riksbank's Financial Stability Report (Financial Stability Report, 2006:1).

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