STAFF MEMO

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On the risk of a fall in household consumption in Norway

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Abstract

This paper utilises household level data from administrative registers to illustrate that Norwegian households' high debt-to-income and loan-to-value ratios could prompt an increase in household saving in the event of a rise in interest rates and/or a fall in house prices. Both higher direct net interest expenses and higher principal payments could displace consumption. The effect will depend on the financial situation of each household. If we assume a 3 percentage point increase in interest rates and a 30 percent fall in house prices, the calculations indicate that total household income available for consumption could fall by as much as 8 percent.

1 Introduction

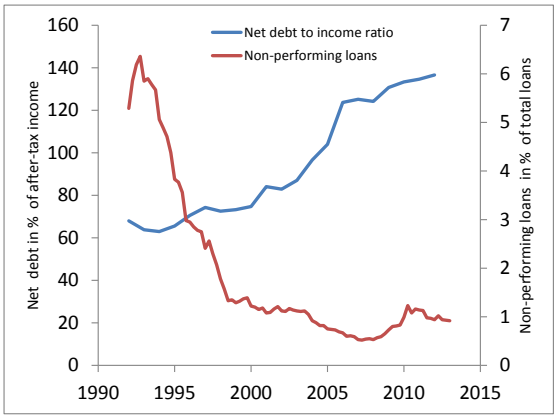
Household debt in Norway, as in many other countries, has grown faster than income for the past twenty years, giving rise to increasing concern about the risk to financial stability. However, the ratio of non-performing loans to households has fallen and credit risk seems limited (see Solheim and Vatne (2013) and Chart 1). This indicates that most households have been able to service their debt given the economic conditions. In this paper, however, we show that the increase in debt-to-income ratios could increase the risk of a steep fall in household consumption. A fall in consumption could trigger an economic downturn that could threaten economic stability.

Net debt relative to after tax income is a measure of how much of after-tax income an increase in debt-servicing expenses of one percentage point requires. We define net debt as debt less bank deposits and debt-servicing expenses as interest and principal payments. In 1992, on average, net debt was 0.68 after-tax income. In 2012, average net debt had increased to 1.37 times after-tax income. This means that Norwegian households have become more sensitive to an increase in debt-servicing expenses.

In Chart 2 we illustrate the effect of a 5 percentage point increase in debt-servicing expenses on after-tax income over the period 1992 to 2012. For the past ten years, net interest expenses have been fairly stable at around 6 percent of after-tax income, reflecting both income growth and falling interest rates. The effect of a 5 percentage point increase in debt-servicing expenses has more than doubled from 2.7 percent of after-tax income in 2000 to 6.4 percent in 2012. Compared with household consumption as given by the national accounts, the extra interest and principal payments amounted to 2.6 percent of consumption in 1992, while the figure was 6.4 percent in 2012.

The idea behind this paper is that households

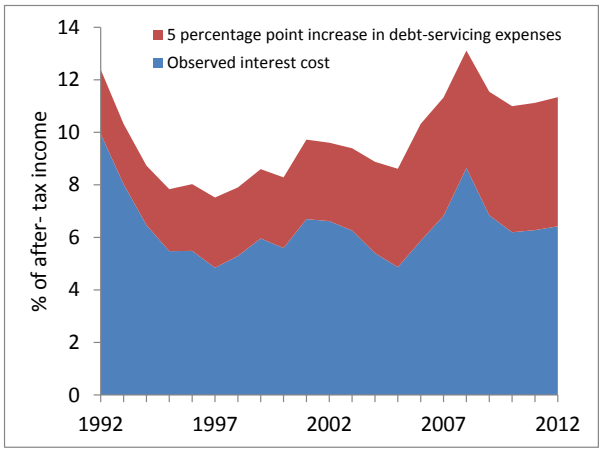
Chart 1: Net debt as a percentage of after-tax income and non-performing household loans as a percentage of total household loans. 1991-2012



Sources: Statistics Norway and Norges Bank

*Thanks to André Kallåk Anundsen, Kjersti-Gro Lindquist, Veronica Harrington and Ida Wolden Bache for useful comments, and to Vidar Pedersen at Statistics Norway for help with the micro data

Chart 2: Observed interest cost on net debt and the effect of a 5 percentage point increase in debt-servicing expenses on after-tax income. 1992-2012



Sources: Statistics Norway and Norges Bank

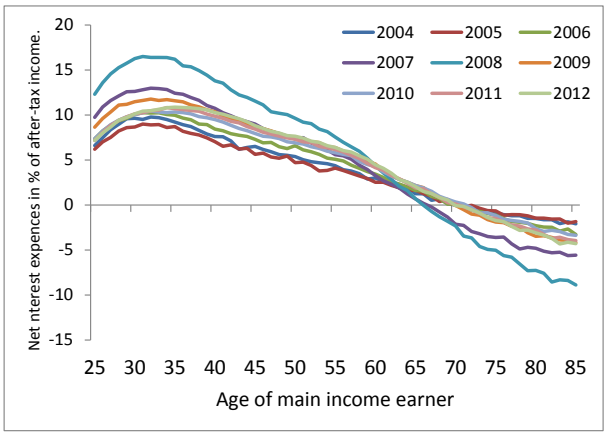
might have a limit on how much of their income they want to use on debt-servicing expenses, and similarly a limit on how much mortgage debt they are comfortable with relative to the value of their house. If households exceed these limits as a result of changes in interest rates or house prices, the households that can afford it will tend to make debt repayments. This will reduce consumption even more than the direct effects of an increase in debt-servicing expenses.

The micro data does not include information on household consumption and saving [1]. Hence, we use some example calculations based on the above assumptions concerning household debt behaviour to illustrate that the rising levels of household debt may increase the probability of high saving ratios and falling consumption. An increase in saving ratios was observed as a result of the Nordic banking crises (see Stigum (2004)), where saving ratios increased to between 6 and 8 percent of disposable income.

Let us look more closely at the share of household income used on interest expenses. Let NITI denote the ratio of net interest expenses to after-tax income. Net interest expenses are interest expenses on loans less interest income on deposits. The actual NITI profile will vary with interest rates and age (see Chart 3). In the rest of the paper, we assume that the target level of interest expenses over the life-cycle is given by the NITI profile of 2012.

[1] We are currently working on a project imputing consumption at the household level based on micro data.

Chart 3: Net interest expenses as a percentage of after-tax income (NITI). 2004-2012

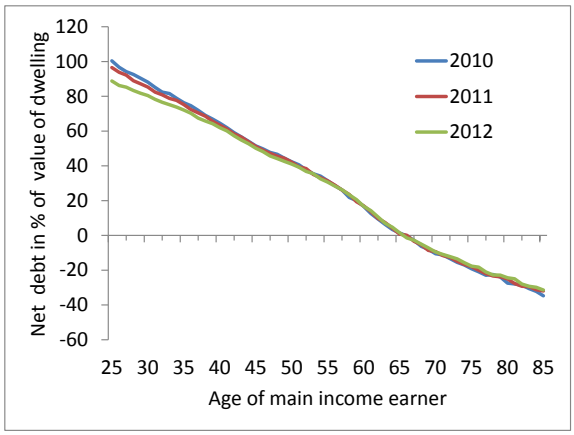


Sources: Statistics Norway and Norges Bank

In a similar way, we assume that households have a target ratio for their net debt to value (NDTV), and that they have a goal for savings in the form of housing wealth at retirement age (see Chart 4). Note that reliable estimates of the market value of dwellings are only available after 2010. A fall in house prices will increase NDTV above the target level, and households may want to reduce their debt. We assume that the 2012 profile represents the target NDTV profile.

The rest of the paper is organised as follows: In Section 2 we present the micro data, Section 3 presents an initial example, and Section 4 presents the results of the exercise. Section 5 includes some sensitivity analysis.

Chart 4: Net debt as a percentage of value of dwelling (NDTV). 2010-2012



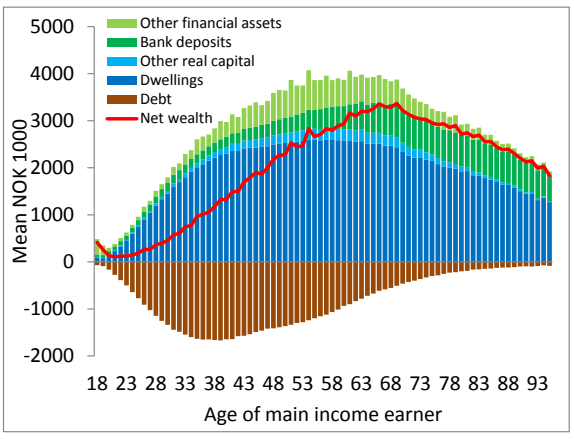
Sources: Statistics Norway and Norges Bank

2 Data

Our primary data source is Statistic Norway's Households' Income and Wealth Statistics, (Statistics Norway, 2014). A household is defined as the persons living in the same dwelling. (For a more detailed analysis of the data in a financial stability context, see Lindquist et al. (2014)). The data are annual end-of-year observations. Our sample covers 1987-2012. For the period 1987-2003, the data are based on the Income Distribution Survey, which is a representative sample survey based on tax return data. The number of households in the sample varies between 3 000 at the beginning of the period to 20 000 at the end of the period. From 2004, the statistics are based on administrative register data such as tax returns, which cover all Norwegian residents at the fiscal year-end, 31 December. In addition to information on each household's composition and the age, etc. of household members, the data include registered income, transfers, debt, wealth and tax payments. We restrict our sample to wage earners and benefit recipients, i.e. to households where wages and benefits are the main source of income. For self-employed persons, we are not able to separate debt for business purposes from consumer and mortgage debt. Since our primary focus is on the two latter types of debt, households where the main source of income is self-employment are excluded. Our sample consists of 4 768 000 persons (94 percent of the full sample) living in 2 277 000 households.

The household balance sheet is dominated by dwellings and debt (see Chart 5). Young households take on debt to buy dwellings, repaying debt

Chart 5: Balance sheet of Norwegian households. Mean. 2012



Sources: Statistics Norway and Norges Bank

with future income. As shown in the chart, the impact of an increase in interest rates and/or a fall in housing value will differ across age groups.

Since 2010, Statistics Norway has estimated the market value of both the primary and secondary dwellings of all Norwegian households (see Holiløkk and Solheim (2011) and Epland and Kirkeberg (2012) for a more thorough discussion). For holiday homes, cars and unregistered securities, tax values typically underestimate market values. With respect to financial assets, unlisted papers are less liquid and can be difficult to value. In addition to the Households' Income and Wealth Statistics, we use the Standard Budget compiled by the National Institute for Consumer Research (SIFO) to estimate developments in the standard cost of consumption (see National Institute for Consumer Research, 2014).

3 An initial exercise

As an example, consider a household with a financial situation given by the mean values of the 25 percent of households with the highest debt (see Table 1). First, let us assume a 3 percentage point increase in the interest rate. This increases net interest expenses by NOK 56 000, given a tax deduction of 28 percent. The resulting ratio of net interest expenses to after-tax income (NITI) increases from 13.6 to 21.1 percent. Assume that households want to return to the original NITI level in 10 years and adjust the NITI by 1/10 of the gap between the original and new NITI. To reach this goal, the household must reduce net debt by NOK 92 000 or 3.5 percent of net debt.

Next, we assume a 30 percent fall in house prices. In the same way as with the increased interest rate, we calculate the necessary principal payment needed to return to the target NDTV ratio of 74 percent. The resulting payment is NOK 78 000, which is smaller than the NITI value of NOK 92 000.

Debt-servicing expenses, (the sum of observed net interest expenses, new net interest expenses and principal payments) now total NOK 180 000. In order to decide if the household is able to make their principal payments, we calculate debt-servicing income, defined as after-tax income less a reference level of living expenses for 2014 as calculated by National Institute for Consumer Research (2014). The table shows that the example household can well afford the principal payments given their debt-servicing income of NOK 483 000.

Before the interest rate rise, interest expenses

Table 1: Mean values of Norwegian households 2012.

	All households	25 % with highest debt	
	Mean NOK 1000		
Debt	1026	2884	
Deposits	358	276	
Net debt	668	2609	
Interest cost	42	111	
Interest income	10	8	
Net interest cost	31	103	
After-tax income	489	755	
Reference consumption	222	272	
Debt-servicing income	267	483	
After-tax income	489	755	
Net interest cost	31	103	
Income disposable for consumption before stress	457	652	
House value	1996	3514	
	Per cent		
Net interest-to-income (NITI)	6.4	13.6	
Net debt-to value (NDTV)	33.5	74.2	
Tax on financial income	28.0	28.0	
Implicit net interest rate	4.7	3.9	
3 percentage point increase in interest rate	25 % with highest debt		
Increased interest cost	56	NOK 1000	
New interest cost	159	NOK 1000	
New NITI	21.1	Percent	
Difference from previous NITI	7.5	Percent	
NTIT adjustment	0.7	Percent	
Adjusted NITI	20.3	Percent	
Adjusted interest cost	154	NOK 1000	
New implicit interest rate	6.1	Percent	
Adjusted debt	2516	NOK 1000	
Principal payments NITI	92	NOK 1000	
30 percent fall in house prices			
New house value	2460	NOK 1000	
New NLTV	106.1	Percent	
Difference previous NLTV	31.8	Percent	
NLTV adjustment	3.2	Percent	
Adjusted LTV	102.9	Percent	
Adjusted debt	2530	NOK 1000	
Principal payments NLTV	78.3	NOK 1000	
After-tax income	755	NOK 1000	
- Observed net-interest cost	31	NOK 1000	
- New net-interest cost	56	NOK 1000	
- Principal payments	92	NOK 1000	
Income disposable for consumption after stress	575	NOK 1000	

Wage earners and benefit recipients. Self-employed excluded.
Sources: Statistics Norway, SIFO and Norges Bank

were 4.16 per cent of after-tax income, while after the rise debt-servicing expenses totalled 23.85 percent of after-tax income. Income disposable for consumption has dropped from NOK 652 000 to NOK 575 000, a reduction of 12 percent.

4 Household level calculations

In this section we take into account the heterogeneity of the households by performing the calculations described in the previous section at household level. In particular, we calculate the initial NITI and NDTV ratios for each household and the ratios after changes in interest rates and house values. We assume that all households face the same interest rates. Furthermore, we calculate each household's debt-servicing income to decide whether or not they can afford additional principal payments.

We use the following rules when calculating debt-servicing expenses:

- Net interest expenses are calculated according to a household's net debt position.
- Only households with positive net debt make principal payments.
- Principal payments are limited by the debt-servicing income of the household.

Not all households are in a financial situation where they are able to make principal payments (see Table 2). One third of the households have no net debt. An additional 9 percent cannot afford any principal payments. More than half the households have enough debt-servicing income to cover both increased interest and principal payments; these households hold 80 percent of total debt.

Table 2: Households and their debt by ability to make principal payments

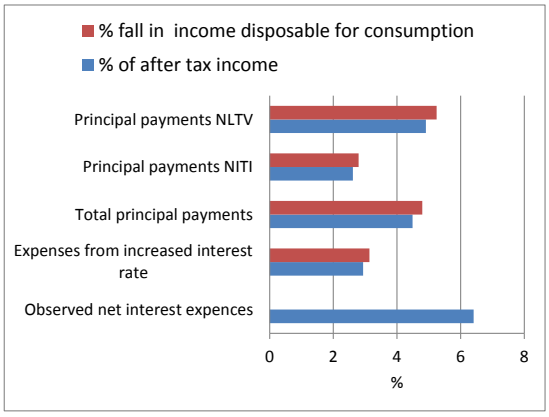
	Debt	Households
No net debt	2.9	33.5
Cannot afford principal payments	8.7	9.3
Can afford some principal payments	8.3	3.3
Can afford full principal payments	80.1	53.9

Sources: Statistics Norway, SIFO and Norges Bank

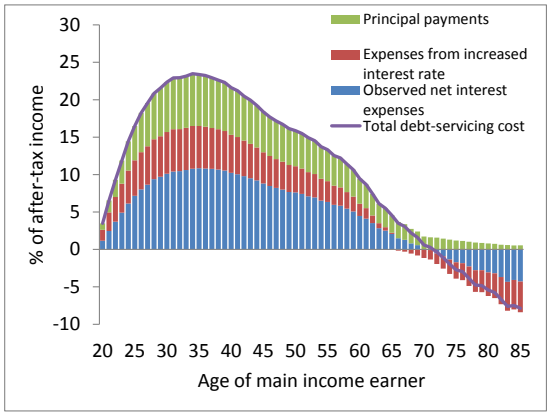
Calculated on a household level basis initial interest expenses total 6.4 percent of after-tax income (see Chart 6a). Extra interest expenses due to a 3 percentage point increase in interest rate on net debt requires an additional 2.9 percent of after-tax income. Accordingly, income disposable for consumption falls with 3.1 percent. Extra principal payments require 4.5 percent of after-tax income and 4.8 percent of income disposable for consumption. In isolation, the principal payment requirements from the NLTV ratio seem to exceed

Chart 6: Results from micro simulations

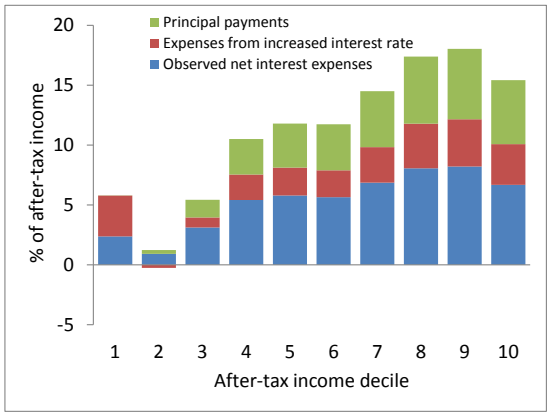
(a) Debt servicing expenses in % of after-tax income and fall in income disposable for consumption. 2012



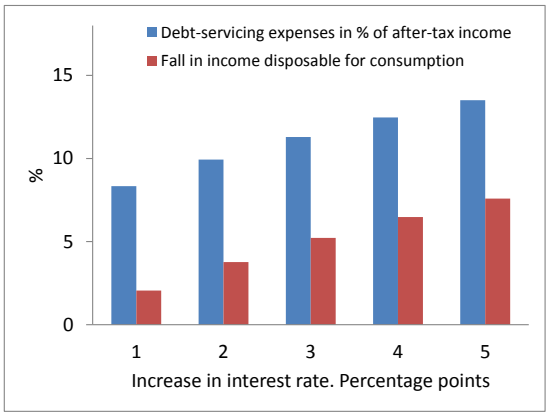
(b) Debt-servicing expenses in % of after-tax income by age of main income earner. 2012



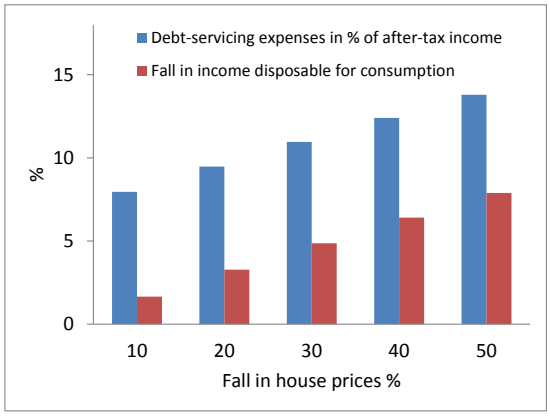
(c) Debt-servicing expenses in % of after-tax income by income decile. 2012



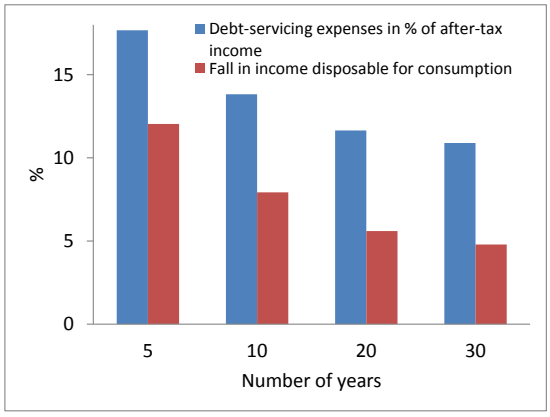
(d) Sensitivity analysis. Different levels of interest rate increase. No house price fall. 10 years down payment. 2012



(e) Sensitivity analysis. Different levels of house price fall. No changes in interest rate. 10 years down payment. 2012



(f) Sensitivity analysis. Different down-payment profile. 3 percentage point interest rate increase, 30 % house price fall. 2012



Sources: Statistics Norway, SIFO and Norges Bank

principal payments from NITI. In total, debt servicing expenses increase to 13.8 percent of after-tax income. Disposable income for consumption falls by 7.9 percent.

Households in their early thirties use nearly one quarter of their after-tax income on debt-servicing expenses (see Chart 6b). Households in the age group 70 years and above have on average more deposits than debt, giving them income from an interest rate rise. Furthermore, high income households use more of their income on debt-servicing expenses than households in lower income groups (see Chart 6c). On the other hand, richer households can afford to use a larger share of their income on debt-servicing expenses and still be able to pay for their basic living expenses.

5 Sensitivity analysis

The size of the interest rate rise and the size of the house price fall used in the analysis in the previous sections are somewhat arbitrary. When we vary the changes in interest rates from 1 percentage point to 5, without any house price fall, debt-servicing expenses increase from 8.5 to 13.5 percent of after-tax income (see Chart 6d). The reduction in disposable income for consumption increases from 2.0 to 7.5 percent.

The effect of an interest rate increase between 1 and 5 percentage points is comparable to a house price fall in the region of 10 to 50 percent without an increase in interest rates (see Chart 6e). Note that a reduction in the repayment period from 10 to 5 years has a strong effect on debt-servicing expenses as a percentage of disposable income. If households reduce the NITI/NLTV gap in 5 years, debt-servicing expenses are calculated at 18 percent, falling to 11 percent when the adjustment period is 30 years (see Chart 6f).

Overall, the sensitivity analysis indicates that disposable income for consumption after debt-servicing expenses could fall as much as 10 percent.

6 Conclusion

Example calculations on micro data indicate that Norwegian households' high debt levels may entail a risk of a sharp fall in consumption if interest expenses increase or house prices fall. Both direct expenses from an increase in interest rates and additional principal payments due to high interest-to-income ratios or high loan-to-value ratios may cause households to cut back on consumption. In an example with a 3 percentage point increase in interest rates and a 30 percent fall in house prices, income disposable for consumption falls by 8 percent.

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