

Debt in Norwegian households within a life-cycle perspective. An analysis using household-level data¹

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1. Introduction

Like many countries, Norway experienced an economic boom prior to the international financial crisis. High income growth was combined with low interest rates. As a result, house prices and household debt increased faster than their income, causing increasing concern about financial stability, see figure 1. In Norway, household default rate and bank losses have remained limited after 2008, see Solheim and Vatne (2012). However, the high and increasing debt-to-income ratio has increased households' interest rate sensitivity. An increase in the loan interest rate at today's debt-to-income level will cause a significantly higher rise in the interest payment to income ratio compared to previous periods.

The home-ownership share in Norway is high, and households typically take up large debt when they are relatively young and enter the housing market. Household debt shows a concave life-cycle pattern. The effect of a change in interest rates, or house prices, will therefore very much depend on where in the life-cycle a household is and also on its housing market affiliation. In this article we use household-level administrative register data to describe and discuss the debt behaviour of Norwegian households.

2. The Data

Our primary data source is Households' Income and Wealth Statistics from Statistics Norway, see Statistics Norway (2014) for details. For a more elaborate analysis of the data see Lindquist et al. (2014). The data are annual end-of-the year observations. Our sample covers 1987-2012 and includes both the Norwegian banking crisis 1988-1993 and the international financial crisis as from 2007. 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 from 3000 at the beginning of the period to 20 000 at the end of the period.

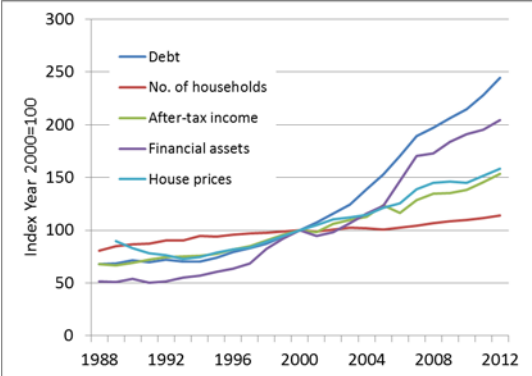
As from 2004, the statistics are based on administrative register data, as tax returns, and cover all Norwegian residents as of 31 December of the fiscal year. In addition to information on each household's composition and the household members' age etc., the data include registered income, transfers, debt, wealth and tax payments.

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We restrict our sample to wage earners and benefit recipients, i.e. to households in which wages and benefits are the main income. For self-employed persons we are not able to separate out debt for business purposes from consumer and mortgage debt. Since our primary focus is on the two latter types of debt, households with main income from self-employment are excluded. In 2012, our reduced dataset consists of 4 767 503 (94 per cent of the full sample) living in 2 277 420 households.

Figure 1: Aggregate household data and house prices. 2000-prices. 1987-2012



Source: Statistics Norway and Norges Bank

Tax return asset values may deviate from market values. Since housing wealth is the dominant asset of Norwegian households, the valuation of dwellings is therefore particularly important. From 2010, Statistics Norway has estimated the market value of primary and secondary dwellings of all Norwegian households, see Holiøkk and Solheim (2011) and Epland and Kirkeberg (2012) for a more thorough discussion. Prior to 2010, however, we expect tax return data to undervalue dwellings. For holiday homes, cars and unregistered securities, tax values typically underestimate the market values³. With respect to financial assets, unlisted papers are less liquid and therefore in general difficult to value.

In addition to Households' Income and Wealth Statistics, we use the Standard Budget compiled by National Institute for Consumer Research to estimate the standard cost of consumption, see SIFO (2014).

3. The balance sheet

3.1 The 2012 tax-return balance sheet

In 2012, the mean value of households' total taxable assets was NOK 2.9 million, see Figure 2 and the third column of Table 1.⁴

³ In Norway, the tax treatment of dwellings varies across three categories; primary dwellings, secondary dwellings and holiday homes. A primary or secondary dwelling can be used as a permanent residence, while a holiday home cannot. If a household owns more than one dwelling, only one can be taxed at the favorable lowest rate.

⁴ Note that taxable assets do not include insurance claims or pension rights. This underestimates the size of the household balance sheet compared to what is reported in some other countries.

The estimated market value of dwellings amounted to nearly 70 per cent of households' total assets, see last column of Table 1. Primary dwellings, i.e. owner-occupied dwellings, were the far most valuable assets, and approximately two-thirds of all households reported living in a self-owned dwelling, see the second column of Table 1 and Figure 2. The rest of real assets, such as holiday homes, cars and boats etc., are reported tax values that we expect to be below market values.

Financial assets amounted to 26 per cent of total assets. Around a half of this were bank deposits, see the fifth column of Table 1. Bank deposits are reported at actual value. The next largest class, one-third of financial assets, is unlisted securities, which includes ownership shares in own companies. Unlisted papers are generally not liquid and difficult to value. By subtracting debt from total assets, we obtain the wealth, or equity, of the households. On average, households' equity ratio (equity-to-total assets) was 64 per cent, see the last column.

Table 1: Households' taxable balance sheet. 2012

	Sum NOK billions	Share ¹⁾ with positive value Per cent	Mean		Share	
			All NOK 1000	Positive value ²⁾ NOK 1000	Asset class Per cent	Total Per cent
Primary dwellings	4 076	64	1 790	2 777	84	62
Secondary dwellings	469	10	206	2 074	10	7
Holiday homes	75	15	33	220	2	1
Other real property	89	13	39	304	2	1
Real property	4 708	71	2 067	2 896	97	72
Production capital	18	3	8	239	0	0
Consumption capital	138	52	60	116	3	2
Real capital	4 864	78	2 136	14 293	100	74
Bank deposits	815	99	358	362	49	12
Norwegian shares and equity certificates	67	14	29	210	4	1
Units in unit trusts	70	28	31	108	4	1
Securities not registered in a securities register	539	8	237	2 810	32	8
Bond funds and money market funds	18	6	8	131	1	0
Debt receivables	78	5	34	636	5	1
Other domestic financial assets	56	30	25	83	3	1
Financial assets abroad	28	5	12	273	2	0
Financial assets	1 671	99	734	742	100	26
Total assets	6 535	99	2 870	2 904		100
Debt	2 336	84	1 026	1 224		36
Equity	4 200	79	1 844	2 345		64
Debt & Equity	6 535	99	2 870	2 904		100

1) Share of households that report a positive value in the tax return.

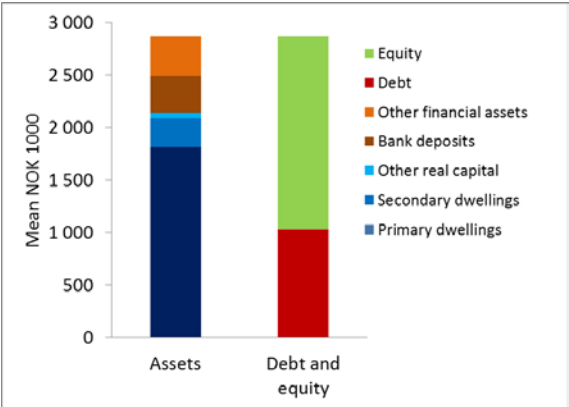
2) Mean value across households that report a positive value in the tax return.

Source: Statistics Norway and Norges Bank

Looking across age of the main income earner, we see that debt, assets and net wealth vary by age, see Figure 3. Net wealth is highest among households in their late sixties. Both debt and housing wealth increase rapidly by age among younger households. Debt peaks among households in their late thirties and decreases thereafter slowly towards zero by age. Housing wealth peaks among households in their late fifties and is relatively high also among households in older age groups. Total

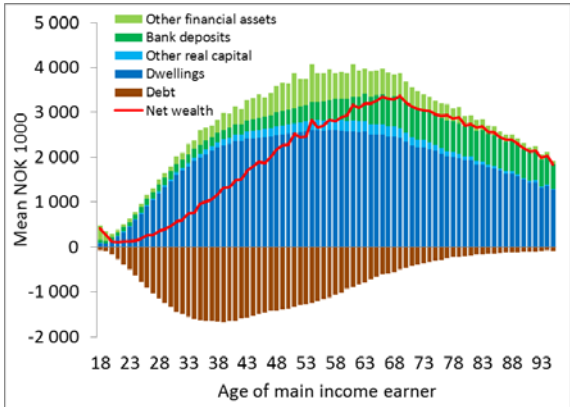
financial assets are largest among households in their sixties. While other financial assets start declining as from households in their fifties, deposits continue to grow and stay high among even older households. Hence, older households hold more liquid financial assets.

Figure 2: Households' balance sheet. 2012



Sources: Statistics Norway and Norges Bank

Figure 3: Households' balance sheet by age. 2012

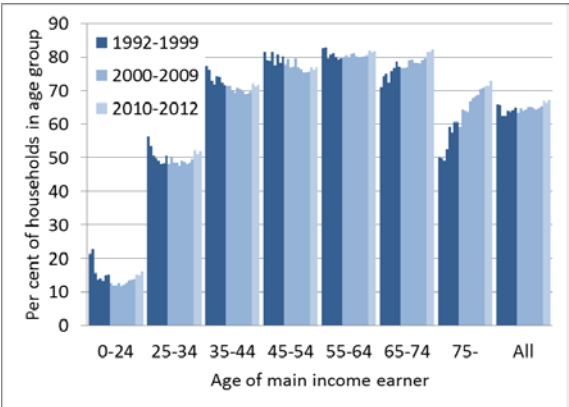


Sources: Statistics Norway and Norges Bank

Net wealth of older households is on average high. In 2012, mean financial assets and total wealth among households at the age of 90 years were NOK 750 000 and NOK 2 million, respectively. A high degree of home ownership and high growth in house prices, coupled with low mortgage debt and high growth in pensions in later years are important explanations for high wealth among old households.

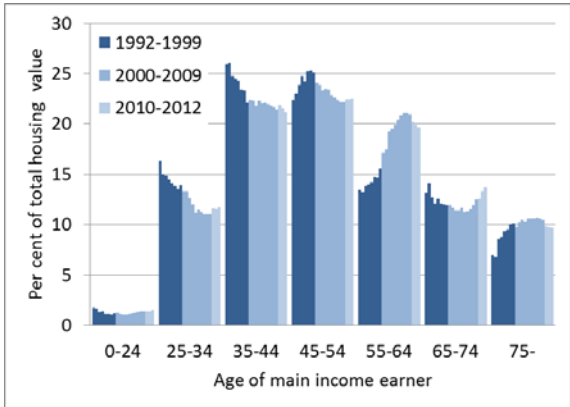
The home-ownership share of households has grown modestly from 63 per cent in 1994 to 67 per cent in 2012, see Figure 4. Among the oldest households, the home-ownership share has increased significantly. The distribution of housing wealth across age groups has changed over time, and more of the housing wealth is owned by older households and less by younger households, see Figure 5.

Figure 4: Home-ownership share by age of main income earner. Per cent. 1992-2012



Sources: Statistics Norway and Norges Bank

Figure 5: Distribution of housing wealth by age of main income earner. Per cent. 1992-2012



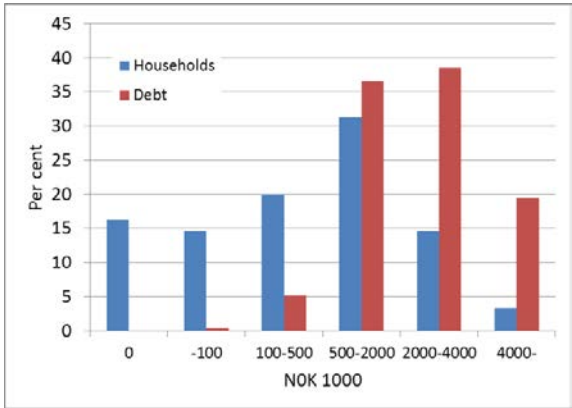
Sources: Statistics Norway and Norges Bank

3.2 Household debt

In 2012, approximately 16 per cent of the households had no registered debt, see Figure 6, blue column to the left. Approximately 50 per cent of the households had debt that was less than NOK

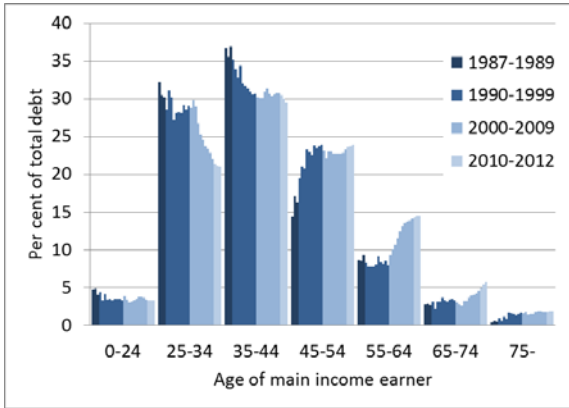
500 000. The mean after-tax income of households with debt this year was a little more than NOK half million. The other half of households held 95 per cent of debt. Hence, a large share of Norwegian households has little debt, and the bulk of household debt is held by households with a relatively high level of debt.

Figure 6: Distribution of households and debt by size of debt. 2012



Sources: Statistics Norway and Norges Bank

Figure 7: Distribution of debt by age of main income earner. 1987-2012



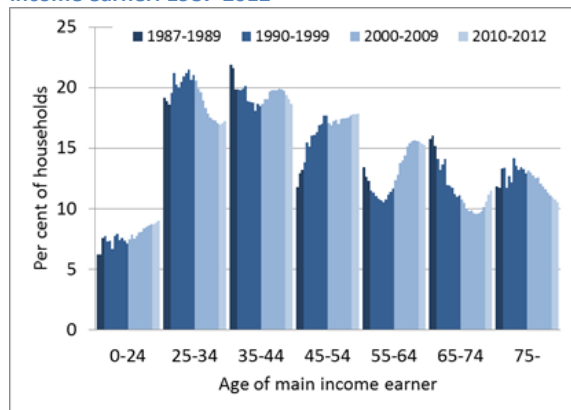
Sources: Statistics Norway and Norges Bank

The distribution of household debt shows a clear life-cycle pattern across age groups, see Figure 7. Considerable debt is held by the primary first-time home buyer and second stepper households, i.e. age groups 25-34 and 35-44. Over time, the distribution of debt across age groups has changed. Debt has shifted from younger to older households, and particularly age group 55-64 years stands out with an increasing share of total debt. The shift in debt is a result of a combination of demographic changes, i.e. a shift in the distribution of households across age groups, a shift in the share of households holding debt within each age group, and a change in mean debt within each age group.

Both the increase in the share of households in age group 55-64 and the decrease in the share of households in age group 25-34 are consistent with the corresponding increase and decrease in share of household debt for these groups, see Figure 8.

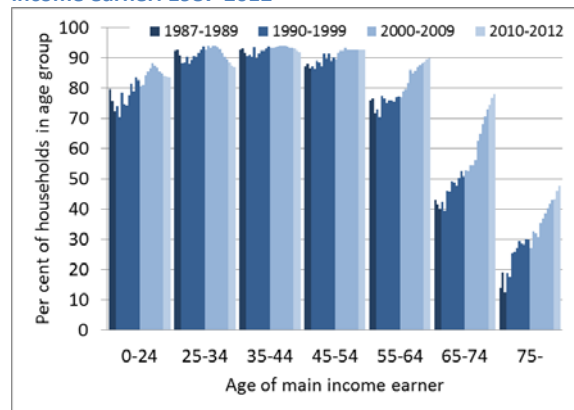
The overall share of households with debt increased from 72 to 84 per cent from 1987 to 2012, see Figure 9. The increase was particularly large among older households, see Figure.

Figure 8: Distribution of households by age of main income earner. 1987-2012



Sources: Statistics Norway and Norges Bank

Figure 9: Fraction of households with debt by age of main income earner. 1987-2012

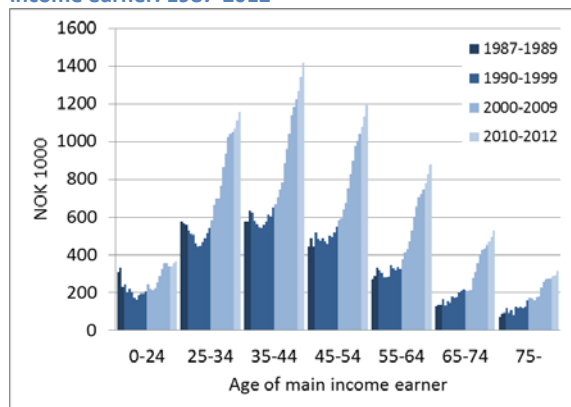


Sources: Statistics Norway and Norges Bank

From the mid-nineties, i.e. beyond the aftermath of the Norwegian banking crisis, mean debt increased for all age groups, see Figure 10. Measured in NOK, the increase was largest for the age groups with the highest level of debt initially. Measured as a change in per cent, the increase was highest for older households with relatively little debt initially.

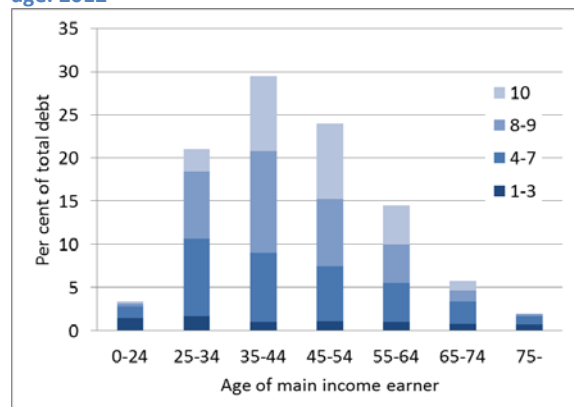
In Figure 11 we look at the distribution of debt across both after-tax income and age. For the age groups 35-64, about two-thirds of the debt is held by households within the highest income deciles. About one-third of the debt is held by households within the medium income deciles. The debt held by households in the age groups 25-34 and 65-74 is approximately equally distributed across income deciles 8-10 and 4-7 respectively.

Figure 10: Mean real debt in 2000-prices by age of main income earner. 1987-2012



Sources: Statistics Norway and Norges Bank

Figure 11: Distribution of debt by after-tax income and age. 2012

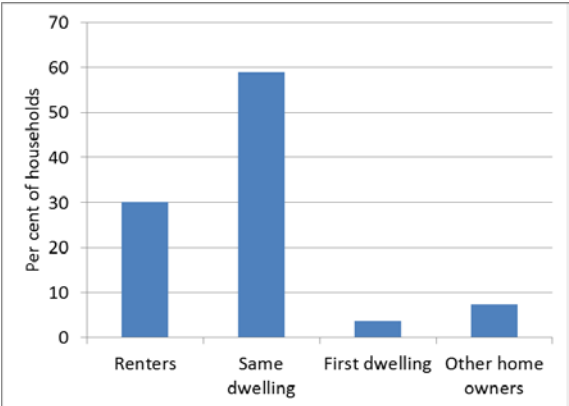


Sources: Statistics Norway and Norges Bank

Household debt is closely related to the housing market and self-ownership. To evaluate households' housing market affiliation, we compare the housing value in households' tax return in two successive years. If a household has no taxable housing wealth in both years, it is classified as a renter. If the housing tax-value changes from zero to a positive number from one year to the next, it is classified as a first-time home buyer. If the tax value changes in accordance with the rule defined by the tax authorities, the household is classified as living in the same dwelling. The rest, including homeowners that change dwelling, are sorted in "Other homeowners". Around 30 per cent of the households are

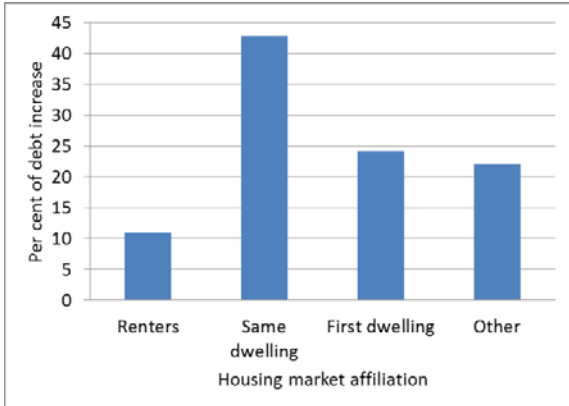
renters, see Figure 12. A little less than 60 per cent stay in the same dwelling, and approximately 11 per cent of the households are either first-time buyers or are moving to a different dwelling.

Figure 12: Distribution of households by housing market affiliation. 2012



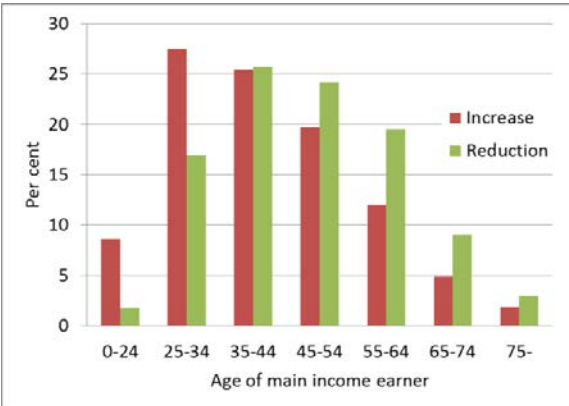
Sources: Statistics Norway and Norges Bank

Figure 13: Distribution of increase in debt by housing market affiliation. 2011-2012



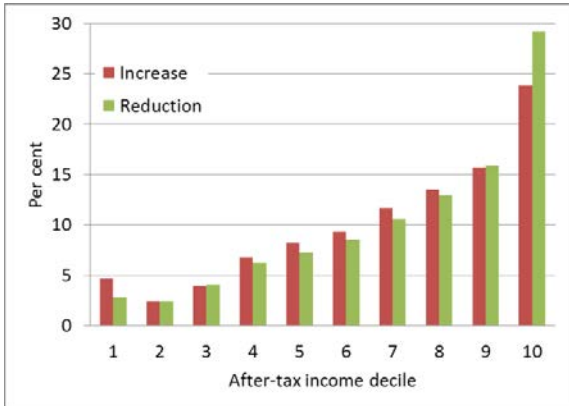
Sources: Statistics Norway and Norges Bank

Figure 14: Distribution of change in debt by age of main income earner. 2011-2012



Sources: Statistics Norway and Norges Bank

Figure 15: Change in debt by income decile. 2011-2012



Sources: Statistics Norway and Norges Bank

In 2012, around 11 per cent of the increase in debt is by households that do not own a dwelling, see Figure 13. Compared with 2005, this fraction was more than halved. Nearly one-fourth of the increase in debt in 2012 is by first-time home buyers and around 20 per cent by households that change dwelling. More than 40 per cent of the increase in debt is by households that remain in the same dwelling.

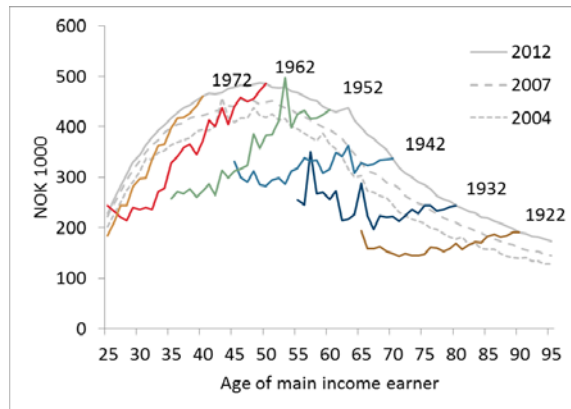
As expected, the change in debt follows a clear age profile, see Figure 14. Age groups 24-34 and 35-44 account for most of the increase in the level of household debt. The latter age group also has the largest share of down payments. The large down payments of age group 35-44 are probably related to the high level of debt of this group, cease of interest-only period and a pyramid-shaped income profile across age groups. There is a strong connection between change in debt and income, see Figure 15. Around 40 per cent of both debt increase and down payments can be found in the two highest income deciles.

4. Birth-cohort analysis

In previous chapters we evaluated the distribution and development of household debt across different household groups, such as age groups. Our household-level data enable us to apply a birth-cohort approach and to consistently evaluate the evolution of household assets and debt over the life-cycle⁵. A birth-cohort consists of households with main income earner of the same birth year. The oldest cohort in our birth-cohort sample is 95 in 1987, i.e. the main income earner is born in 1892, and the youngest cohort in our sample is 25 in 2012, i.e. the main income earner is born in 1987. All cohorts in between 1892 and 1987 are included in the birth-cohort sample.

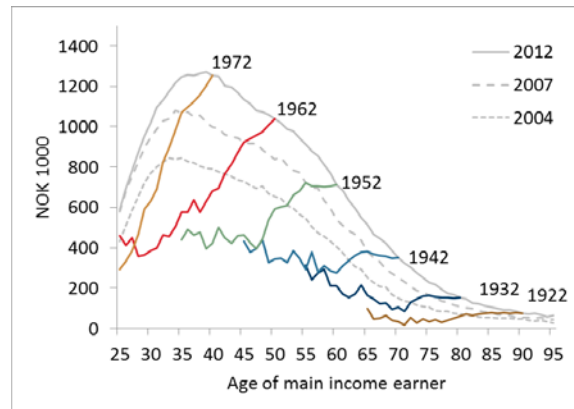
To support our discussion, we present graphs that enable us to highlight the development over the life-cycle of a limited number of cohorts in addition to show the profile each year across all cohorts. We truncate our data at age 25 and 95, i.e. we do not display the results when the main income earner is below 25 or above 95. The oldest cohort we highlight is born in 1922 and is 65 in 1987 and 90 in 2012. The youngest cohort we highlight is born in 1972, it is 25 in 1997 and 40 in 2012.

Figure 16: After-tax income by age and birth year of main income earner. Mean. 2000-prices



Sources: Statistics Norway and Norges Bank

Figure 17: Debt by age and birth year of main income earner. Mean. 2000-prices



Sources: Statistics Norway and Norges Bank

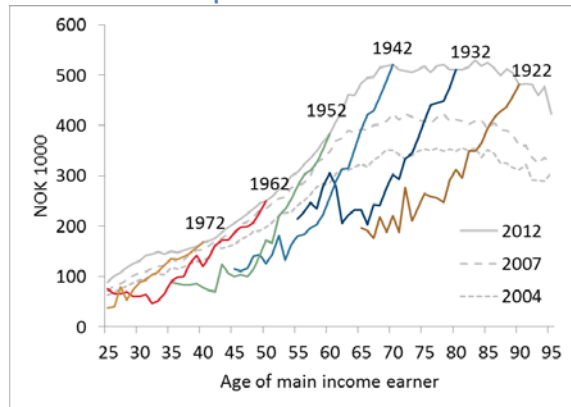
We start by showing the mean, i.e. per household, real after-tax income, see Figure 16. The solid and dotted grey lines in each graph show the cross-sectional distribution in three calendar years. For example the 2012-solid line shows the real after-tax income across all cohorts this year, and the age of the main income earner depends on the year of birth. The coloured lines trace the development of six specific cohorts over time, i.e. the part of these cohorts' life-span that is covered by our data.

Looking across the same life-cycle period, i.e. age, of our six selected cohorts, it is clear that mean real income in general has grown over time. Later cohorts have higher real income than earlier cohorts. Concentrating on the cohort profiles, we see that real income tends to increase most in the earlier life-phases of a cohort and declines or flattens out as the households enter their sixties, which is also the normal retirement age. The cohorts experienced low, or even negative, income growth in the late 1980s and early 1990s. This is related to the severe Norwegian economic downturn at that

⁵ Analyses of household saving and debt often take the life-cycle hypothesis (LCH) as a starting point. This theory, which was first presented in Modigliani and Brumberg (1954), provides a framework for analysing household spending and saving behaviour over the life-cycle.

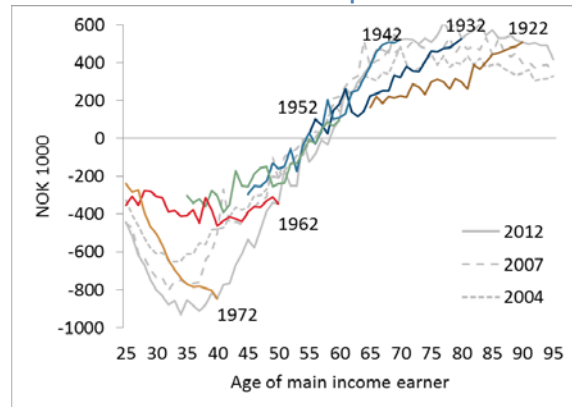
time. Real income growth has been high in the 2000s. This is true also for pensions, which to a large degree have been linked to wage growth for manufacturing workers. Real income among cohorts in their pensioner phase shows renewed growth in the 2000s.

Figure 18: Deposits by age and birth year of main income earner. Mean. 2000-prices



Sources: Statistics Norway and Norges Bank

Figure 19: Net financial assets by age and birth year of main income earner. Mean. 2000-prices



Sources: Statistics Norway and Norges Bank

Figure 17 shows the development in mean real debt. Looking across the cohorts, we see that real debt at the same life-cycle period, i.e. age, increases from earlier to later cohorts. This is particularly true in the 2000s, and there is a sharp shift upwards in the grey curves. However, the growth in debt is broadly levelling off when the financial crisis erupts.

To discuss the borrowing and pay-off behaviour of households within the birth-cohort framework, we must look at the development in the level of mean debt over the life-cycle of each cohort. The earliest cohorts pay down their debt up until the 2000s. The strong increase in real debt in the 2000s of the majority of the cohorts may signal a change in the attitude of holding debt coupled with an increase in the availability of credit.

We now turn to household savings in real deposits and real net financial wealth. In Figure 18 we see that our earliest cohorts continue to build up real deposits towards the end of their life-cycle. There is a tendency among households in these early cohorts to reduce their deposits in their sixties, but this is more than offset in their seventies. This increase in deposits among the earliest cohorts is in line with the shift in the composition of financial assets that we found in Figure 3. There we saw a shift from other financial assets to the most liquid and safe financial asset, i.e. deposits, among older households.

Figure 19 shows household real net financial wealth⁶. The broad picture is that households born prior to the mid-fifties go from having negative to positive real net financial wealth around their mid-fifties. We now concentrate on the life-cycle period with negative net financial wealth. By comparing the grey curves, we see that there is a clear negative shift in households' wealth position between earlier cohorts and those born after the mid-sixties. However, later cohorts have a longer life

⁶ We should remind the reader that the value of other financial assets is volatile. Due to data limitations prior to 2010, we do not include housing wealth.

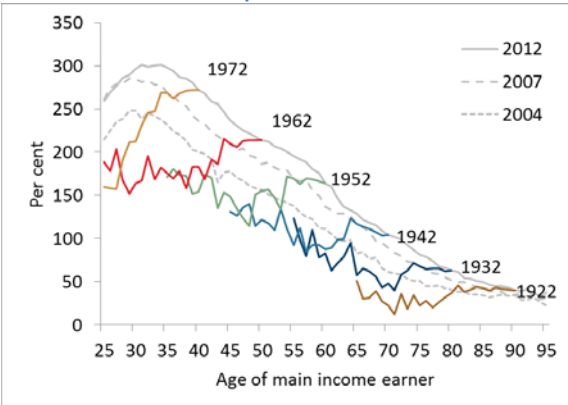
expectancy and, due to pension reforms⁷, a higher expected retirement age. This may affect the down-payment profile. Moving to the life-cycle period with positive real net financial wealth, we see that later cohorts have more net wealth than earlier cohorts when we compare across the same age. Hence, the cross-cohort distribution of net wealth has become deeper on the negative side and higher on the positive side. The shift on the negative side is larger than on the positive side, however.

Debt-to-income ratio is a frequently used indicator of credit risk in the household sector. Depending on what one wants to highlight, different measures can be used.

One measure is the debt-to-after tax income. After-tax income is the income available for consumption, savings and debt service. This ratio is a rough measure of the share of household income needed to service the debt per percentage point loan-interest rate. Due to high debt growth, this share increased from 1.3 in 2000 to 2.1 in 2012. Hence, in the 2000s, Norwegian households have become more vulnerable to interest rate increases.

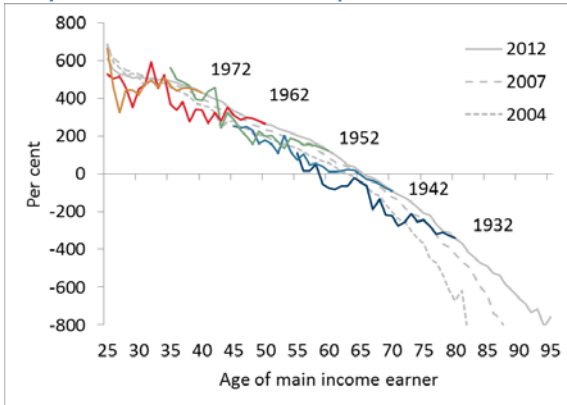
A second alternative is the net debt-to-debt servicing income ratio. Debt servicing income is after-tax income less standard cost of consumption. This income measure can be interpreted as the maximum income available to households to service debt. In the 2000s, debt servicing income has grown faster than after-tax income. This is because prices of important items in the standard budget basket have fallen due to an increasing share of cheap imports from emerging economies such as China. This has left more of households' income available to debt service. Since households may easily use their liquid deposits to increase the down payment of their debt, in this more concentrated debt servicing capacity measure, we choose to use net debt, i.e. debt minus deposits, as the nominator.

Figure 20: Debt-to-after tax income ratio. Cohort analysis. 1987-2012. Mean. 2000-prices



Sources: Statistics Norway and Norges Bank

Figure 21: Net debt-to-debt servicing income ratio. Cohort analysis. 1987-2012. Mean. 2000-prices



Sources: Statistics Norway and Norges Bank

Figure 20 shows the evolution in debt-to-after tax income across cohorts. Before the 2000s, the households seem to largely “follow the steps” of older households. After the 2000s, there is a general and significant shift upwards in this measure of the debt-to-income ratio. Younger households (for example the 1972 cohort) reach a debt-to-after tax income ratio of 300 per cent at the end of our sample. At this level of debt-to-after income, roughly speaking, if the loan interest rate increases by one per cent, the corresponding increase in interest payments equal three per cent of after-tax

⁷ The implementation of the reform started in 2011, but important elements were known at an earlier stage.

income. The effect of an increase in the interest rate measured as the increase in interest payments as a share of income after-tax is much higher in younger compared to older cohorts.

If we instead look at net debt-to-debt servicing income, the development is rather different, see Figure 21. This debt-ratio measure declines over time in all elderly, and also many of the middle-age, households. Even among younger households this measure shows a more modest development. While the debt-to-after-tax income measure indicates that younger generations have increased their debt ratio compared with earlier generations, this is less clear when we look at the alternative net debt-to-debt servicing income ratio. One may say that younger cohorts merely have used low interest rates and favourable prices on reference consumption to increase their debt.

5. Conclusions

In this paper we use household-level data to evaluate the distribution of debt across households and their debt servicing capacity in a life-cycle perspective.

The home-ownership-share in Norway is high, about two-third of households own the dwelling they live in. Households borrow largely in their thirties and forties to buy a dwelling, and household debt-to-income ratio peaks among these age groups. Balance sheet data show that housing wealth is important and accounts for about 60 per cent of total household wealth. Households' net wealth, i.e. their equity-to-total assets ratio, was 64 per cent in 2012.

Debt has shifted from younger to older households. This shift is very much due to a stronger growth in debt among older than younger households, but also demographic changes, i.e. a shift in the distribution of households across age groups and a shift in the share of households holding debt within each age group, have contributed. The distribution of housing wealth has also shifted from younger to older households.

A large share of households adjusts their level of debt up and down within a year. Middle-aged household both take up most debt and pay most down. Around 40 per cent of the gross increase in household debt can be related to home-equity withdrawal, while over 45 per cent is related to first-time home-buying or households buying a new house.

The debt-to-income ratio increased significantly across all cohorts in the 2000s. Comparing households born in the 1960s and 1970s, we find that, in their thirties, the households born in the 1970s have a debt-to-income ratio that is two times higher. The higher the debt-to-income ratio, the higher the share of income necessary to service each unit increase in the loan interest rate. Hence, households' interest rate sensitivity has increased over time.

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