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Elin Halvorsen

**Financial Deregulation and
Household Saving**
The Norwegian Experience
Revisited

Abstract:

I use new micro data to study the effects of credit deregulation on the Norwegian household savings decline in the mid-1980s. This paper has three main findings. First, the decline in saving started in 1983, a couple of years earlier than previously thought on the basis of National Accounts data. Second, it was primarily young and middle-aged households who increased their consumption. Finally, the rapid increase in housing prices in 1985-86 may have been an important determinant of older and retired households' saving through reversed mortgages, but cannot on its own explain the decline in savings that started in 1983.

Keywords: Saving; consumption; financial deregulation; wealth effects and house prices.

JEL classification: D91, E21, E44

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1 Introduction

Different hypotheses have been proposed to explain the decline in household saving rates that was seen in many countries in the mid-1980s, including UK and the Nordic countries. The savings decline or "consumption boom" in the mid-1980s has been explained as an effect of liberalization of the credit market, and as a demand pull caused by increases in current and expected wealth. In the first case, going from a constrained to an unconstrained credit market regime will increase aggregate demand because available credit will satisfy pent-up demand for durables and investment in housing. In the second case there may be little effective rationing, and an increase in consumption demand is simply a function of an increase in current wealth and expected income. A rise in current wealth may be caused by higher market value of assets such as housing, and an increase in expected human capital may be due to revised expectations about future income streams.

The two explanations have divergent implications for a number of policy issues, the level of long run growth and the duration of current account deficits being among the most prominent. In Norway, the strong rise in consumption of durables and housing caused negative saving rates and a current account deficit. This is more likely to be a temporary phenomenon when the cause is a reaction to deregulation. If the main explanation is a revaluation of current wealth or more optimistic expectations about future income, there may be more concern for long run consequences, and even if the expectations are revised so that the level of saving returns to a higher level, booms in the market value of real assets will probably re-occur. This latter concern has motivated several studies to reconstruct the macro consumption relationship used in macroeconomic forecasting models so as to be able to predict new slumps in saving.

In terms of macroeconometrics, the two hypotheses correspond to a regime-shift versus a mis-specification of the consumption function. In Norway, Brodin and Nymoén (1989a, 1992) argue in favor of the mis-specification hypothesis or the house price explanation. They find that including in the aggregate consumption function a wealth variable, which reflects the market value of housing, makes the co-integrating relationship perform much better in the post-regulation period. Using an extended sample period, Eitrheim, Jansen, and Nymoén (2002) confirms the finding of a wealth elasticity in the range of 0.15-0.29. Other studies that argue in favor of the house prices as the major explanation of the Norwegian consumption boom are Lehmuusaari (1990), Koskela and Virén (1992), and Berg (1994).

Only a few papers have used micro data in studies of the effects of deregulation on household consumption¹. In this paper I reevaluate the savings decline in the mid-1980s using new micro data on household saving. I find that micro data seems to support the hypothesis of a temporary readjustment following financial deregulation, rather than the wealth effect hypothesis. The paper has three main arguments for this interpretation. First, according to the data the decline in saving started in 1983, a couple of years earlier than previously thought on the basis of National Accounts data. The decline was caused by an exceptional increase in expenditure on durables in 1983-85. The process of financial reform does not give any clear cut information about when a consumption boom was

¹In the UK, Attanasio and Weber (1994) and Miles (1997) use expenditure surveys similar to the data in this paper.

likely to occur. On the other hand, indicators of credit supply to households do not contradict the hypothesis that it started in 1983.

Second, theoretical implications of financial deregulation are confirmed in the data. The transition from regulated to deregulated credit markets implies a readjustment of saving and consumption of those households who were previously constrained. It is likely that the effect would be strongest for young to middle-aged households, and less so for older and retired households. The micro data show that it was primarily young and middle-aged households who increased their consumption in the "first" part of the consumption boom (1983-85), while all households shows high non-housing consumption rates in the "second" part of the boom (1986-87). As argued by Steigum (1992), credit financed consumption was in this period also driven by general euphoria and bad banking practices.

Finally, I test the hypothesis that households reacted to changes in wealth stemming from a rapid increase in housing prices in 1985-86. According to this hypothesis we would expect to find a difference between homeowners and non-homeowners. There are no such differences in the data. Nor does the results change if we omit from the sample those households who moved during the period and thus had the opportunity to cash in gains on housing. However, a wealth effect through reversed mortgages may explain the savings slump of older and retired households in the later part of the consumption boom.

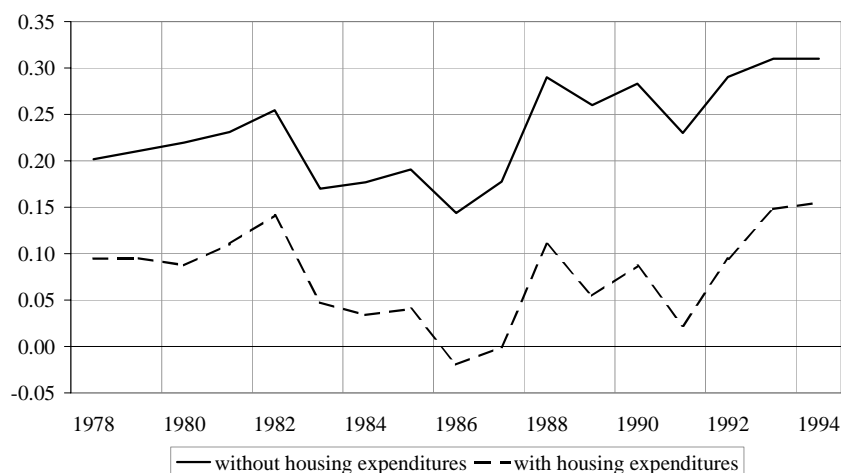
The paper is organized as follows, Section 1 presents the aggregate micro data on saving and consumption during the period and discuss the timing of the deregulation in relation to the consumption boom. Section 2 illustrates the theoretical implications of a deregulation, while Section 3 presents the regression results. Section 4 looks at the alternative house price explanation, and Section 5 discuss how macroeconomic development and expectations about future incomes may have interacted with the result of the deregulation. Finally, in Section 6 the results are summarized.

2 The decline in savings in the mid-1980s

According to the micro data, saving rates fell in 1983 and remained low relative to previous levels until 1988. I use data from the Survey of Consumer Expenditures (SCE), as well as income data added from tax records in order to determine saving as non-consumed income. Consumption include expenditures on non-durables and durables. The income measure added to the survey data is labor income including pensions, plus pure transfers, minus total taxes. Since tax records have no information about transfers that are not subject to taxes, such pure transfers are imputed from household characteristics. The income measure does not include net capital income (see appendix A for details).

Figure 1 shows the sample aggregate saving rate with and without housing expenditures, the former represented by the dashed line and the latter by the solid line. Housing expenditures generally consist of interest paid on loans/mortgages, rent, fuel and maintenance. Since interest paid on mortgages would be part of the income definition as negative income if capital income had been included, it seems that the most consistent savings measure would be to exclude housing expenditures. The median household may be interpreted as the representative household, and is often used in micro studies because it is

Figure 1: Sample aggregate, saving relative to labor income after tax

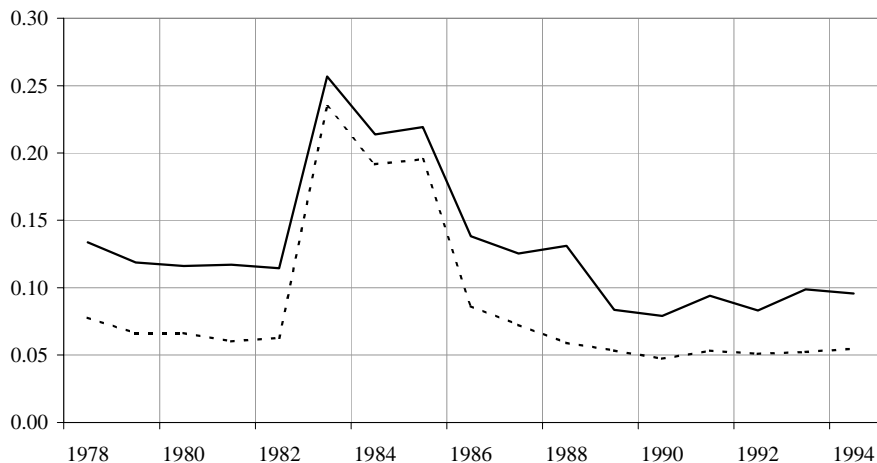


less influenced than the mean by extreme values. However, the national aggregate is affected by extreme values and we would like a micro measure that is comparable. Because of a large number of outliers and skewness of the micro data, the mean saving rate is not fit for use (see appendix A). An alternative concept of mean is average saving in percentage of average income in a given period (or for a particular group). This is equal to total saving in percentage of total labor income in the sample, thus aggregating on the sample instead of the whole population.

According to the figure, sample aggregate saving rates fell in 1983 and remained low relative to previous levels until 1988. The impression of a slump in this period is reinforced by saving rates that are unusually high in 1982 and in 1988. According to table A.3 in the appendix, mean and median income after tax in the sample is exceptionally high in 1988 and exceptionally low in 1991. Likewise, the peak in 1982 is due to exceptionally low mean and median consumer expenditures. On the other hand, table A.3 and figure 2 show that the savings slump in 1983-87 has its counterpart in a marked increase in expenditures on durables. Expenditures on durables are more than twice as high in 1983 compared to the previous five years, and remain high in 1984 and 1985. There was a particular boom in car purchases in 1985.

As a consequence, the micro data indicate that household saving declined two years earlier than previously thought on the basis of the National Accounts aggregate saving rate. In the National Accounts, the aggregate saving fell 7 percentage points from 1984 to 1985, and declined even further in 1986 and 1987. After that, the aggregate saving rate gradually recovered. A comparison of the two data series is discussed in more depth in Halvorsen (2003). The diverging timing of the savings decline is independent of how saving is defined with regards to net capital income and housing expenditures. However, for both series, the decline is largely dependent on including durables in the consumption concept and disregarding capital gains on real assets (see Moum and Nesbakken,

Figure 2: Expenditures on durables as a fraction of total expenditures, mean (solid line) and median (dashed line).



1991, for a discussion). In Halvorsen (2003) I conclude that the remaining dissimilarities may be caused by the way the National Accounts statistics are adjusted by using several sources, or because the sample surveys may not be completely representative. For instance, they may have an under-representation of wealthy households.

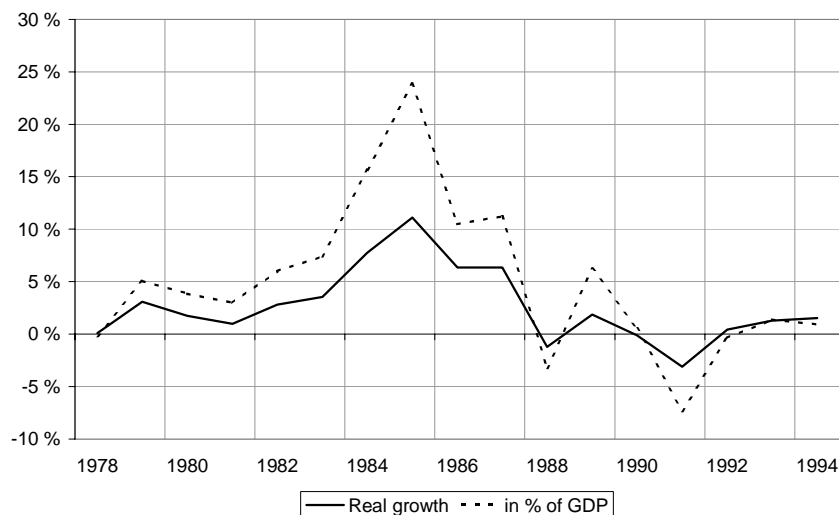
Previous empirical work on the Norwegian consumption boom has used the fall in 1985 of the National Accounts' saving rate to time the effect of financial liberalization (see Brodin and Nymoen, 1989a, 1992, Boug, Mork and Tjemmland, 1995, and Eitrheim, Jansen and Nymoen, 2002). But, financial liberalization was a long process that started at the beginning of the decade and proceeded in several steps.

2.1 Financial reform

The deregulation in Norway consisted mainly of the abolishment of direct regulations in the credit market, thus limiting the government's intervention. Prior to the deregulation, Norway had a long history of regulated, low interest rates, government involvement in the provision of subsidized mortgage loans, extensive direct regulation of private banks, as well as regulation of international capital movements. Low interest rates, high inflation and full deductibility of mortgage interests gave borrowing incentives of households that were to a large extent mitigated by credit rationing.

Grønvik (1992) describes the process as consisting of the following: A liberalization of the bond market took place in several steps between 1982 and 1985, allowing more competition among banks and other lending institutions in the housing and business markets. Furthermore, there were several reductions in reserve requirements, ending with the primary reserve requirements being abolished in 1987. The overall response of the banks was to increase lending

Figure 3: Growth in credit to households.



to households, and to compete for customers. According to Steigum (1992) the deregulation triggered a competitive race among banks, and bad banking practices were adopted in response to the increased competition in the credit market. As an example of the expansionary bank behavior, he points to the fact that from 1983 to 1986 the commercial banks in Norway increased their number of branches by 15 percent, and the savings banks by 5.5 percent. According to figure 3, the resulting growth in total credit to private households was particularly high in 1984-87, with a peak in 1985, but on its way up already in 1982 and 1983.

As another part of the reform, there was a removal of the ceiling on deposit rates in January 1978. After that, interest rates were regulated until 1980 when the first "interest rate declaration" was made. In this declaration, individual institutions were allowed to adjust interest rates upwards when their rates were lower than a commonly accepted national level. At the same time, the overall interest rate level was allowed small increases. The declaration was changed several times and eventually abolished in September 1985.

On its own, an interest liberalization tend to increase interest rates, and table 1 show how the real borrowing rate (an average of borrowing rates less inflation) went from below zero to above 7 percent even before the final interest rate declaration was abolished. Some of this increase was due to lower inflation, thus the rise in nominal interest rates was smaller. After that, the rates continued to increase until they reached their peak in 1992. In the second column of the table we see that the after tax rate for average incomes was negative in the beginning of the 1980s, approximately zero in 1983-1987, and around 5 percent after 1987. Because of the high marginal income tax, the after tax rate was negative until 1987 for high incomes. It follows that high income households had an even stronger incentive to borrow and invest in real assets (or any asset with a positive yield), and for a longer period.

Table 1: Real interest rates

	Before tax lending rate	After-tax lending rate (average inc.)	Lending – deposit wedge	Gray market lending rate
1980	1.5	-5.1	5.1	2.9
1981	-0.4	-6.8	5.3	1.4
1982	2.5	-4.0	5.4	4.5
1983	5.4	-0.8	5.3	6.4
1984	7.2	0.9	4.5	7.6
1985	7.9	1.5	4.5	8.1
1986	8.9	1.1	5.7	7.8
1987	8.3	1.1	5.7	–
1988	10.1	3.3	6.1	–
1989	10.3	4.4	6.1	–
1990	10.6	4.6	5.8	–
1991	10.8	5.3	5.5	–
1992	12.0	7.3	5.2	–
1993	6.9	5.4	4.8	–
1994	7.0	4.5	4.1	–

Sources: Statistics Norway, Norges Bank and Moum (1989).

It would seem that the wedge between borrowing and lending rates is an important piece of evidence on credit market imperfections (King, 1986, and Hayashi, 1987)². According to table 1, the wedge between nominal borrowing rates and lending rates was somewhat lower in 1984 and 1985, at the time the competition among banks became critical. In 1986 the wedge is driven up again, possibly because the competition led the banks to lower the fees charged on services, in which case revenue from a wedge would be needed.

In the beginning of the 1980s, the credit rationing of households (and small firms) gave market participants strong incentives to find ways to circumvent the regulations by gray market operations. In fact, at the time, one of the arguments in favor of liberalization was that the controls were not working as intended. Little is documented about the efficacy of the gray market at this time, but Moum (1989) has estimated gray market interest rates. These are shown in the last column of table 1. It seems there was a demand for credit in the gray market in the beginning of the 1980s, and that this was supplied at rates one or two percentage points higher than the official interest rates. However, by 1984, the gray market interest rate is close to the official level, which may indicate that market participants were supplied sufficiently elsewhere.

To summarize: according to the process of financial deregulation, indicators of credit supply, and interest rate movements, there is nothing that contradicts the hypothesis that the deregulation's effect on credit supply and demand took effect already in 1983.

²On the other hand, a wedge is also consistent with an equilibrium model of the credit market with imperfect information or transaction costs.

3 Theoretical implications of deregulation

This section discusses the effects of financial deregulation, using the overlapping generations framework, originally developed by Samuelson (1958) as the analytical basis. Consider a simple overlapping-generations model where households live for three periods. Each period is assumed to be of equal length. Preferences are given by

$$U = \max_c \{ \ln c_t^y + \beta \ln c_{t+1}^m + \beta^2 \ln c_{t+2}^o \} \quad (1)$$

where β is the discount factor and $(c_t^y, c_{t+1}^m, c_{t+2}^o)$ is consumption in young, middle and old age. Households maximize utility subject to an intertemporal budget constraint

$$c_t^y + \frac{c_{t+1}^m}{1+r} + \frac{c_{t+2}^o}{(1+r)^2} = w_t^y + \frac{w_{t+1}^m}{1+r} + \frac{w_{t+2}^o}{(1+r)^2} \quad (2)$$

When households have access to perfect capital markets, optimal consumption is

$$\begin{aligned} c_t^y &= \lambda_t \\ c_{t+1}^m &= \lambda_t \beta (1+r) \\ c_{t+2}^o &= \lambda_t \beta^2 (1+r)^2 \end{aligned} \quad (3)$$

where

$$\lambda_t = \frac{1}{1 + \beta + \beta^2} \left[w_t^y + \frac{w_{t+1}^m}{1+r} + \frac{w_{t+2}^o}{(1+r)^2} \right]$$

Thus, they want to consume in each period a fraction of discounted lifetime resources. This is the traditional life-cycle/permanent income result.

3.1 Credit constraints

Let us first consider the position before financial liberalization. The initial, financially repressive, regime is characterized by limited access of consumers to financial intermediation. A simple way of thinking about this is to assume that consumers are not allowed to become net debtors in this regime.

$$\begin{aligned} w_t^y - c_t^y &\geq 0 \\ (w_t^y - c_t^y)(1+r) + (w_{t+1}^m - c_{t+1}^m) &\geq 0 \end{aligned} \quad (4)$$

For simplicity I have assumed a case where retirement income is zero ($w_{t+2}^o = 0$). When the borrowing constraints are binding, this is a corner solution, and in this model, since $w_{t+2}^o = 0$, constraints cannot be binding in the second period. Constraints *can* bind in the household's first period. When credit constraints are binding for a young household, the household will consume all of its current resources, saving nothing.

In order for consumers to experience credit constraints they must initially want to borrow, and there are two situations in which consumers typically would want to borrow. One such situation is when consumers are impatient ($\beta < 1$). Optimal consumption over the life cycle would then be falling, a plan that would

typically call for borrowing in the early years. Another situation is when consumers expect income growth. Also in this case would we expect young households to be constrained, but some more than others, depending on individual expectations and career prospects.

If the borrowing constraint in (4) is binding the optimal solution will be

$$\begin{aligned} c_t^y &= w_t^y \\ c_{t+1}^m &= \mu_t \\ c_{t+2}^o &= \mu_t \beta (1+r) \end{aligned} \tag{5}$$

where

$$\mu_t = \frac{1}{1+\beta} w_{t+1}^m$$

Note that, when the consumer is constrained in youth and w_t^y is relatively small compared to the latter period, μ is greater than λ . In an example where income in the first period is 1 and income in the second period is 8, and we simplify by assuming $r = 0$ and $\beta = 1$, the optimal consumption path $(c_t^y, c_{t+1}^m, c_{t+2}^o)$ will be $(1, 4, 4)$, while in the unconstrained case the path would have been $(3, 3, 3)$.

3.2 The transition to a deregulated economy

These results can be used to construct a savings function for the economy, and hence to study how saving responds to a change from a constrained to a non-constrained optimum. Let n^y , n^m and n^o be the number of young, middle aged and old in the population. If we assume that all consumers face the same income path, aggregate income is given by $W_t = n^y w_t^y + n^m w_t^m$. When credit constraints are binding for young households, then aggregate consumption and saving can be written as

$$C_t = n^y w_t^y + n^m \mu_{t-1} + n^o \beta (1+r) \mu_{t-2} \tag{6}$$

$$S_t = n^m (w_t^m - \mu_{t-1}) - n^o \beta (1+r) \mu_{t-2} \tag{7}$$

In equation (7), the behavior of the young has no effect on aggregate saving, since they are assumed to be constrained by equation (4). On the other hand, changes in the current income of young households will have a proportionate effect on consumption. Aggregate saving depends on income of the middle-aged alone (middle-aged and old if $w^o > 0$), the wealth of the middle-aged and old, defined as the present value of lifetime resources, and interest rates. After financial deregulation, aggregate consumption and saving become

$$C_t = n^y \lambda_t + n^m \beta (1+r) \lambda_{t-1} + n^o \beta^2 (1+r)^2 \lambda_{t-2} \tag{8}$$

$$S_t = n^y (w_t^y - \lambda_t) + n^m (w_t^m - \beta (1+r) \lambda_{t-1}) - n^o \beta^2 (1+r)^2 \lambda_{t-2} \tag{9}$$

In the unconstrained case, all generations affect the behavior of aggregate savings, which now depend on current income, wealth (defined as the discounted value of the full endowment stream), and interest rates. This implies that financial liberalization will result in an increase in the sensitivity of aggregate saving to wealth, interest rates, and expectations about income, while consumption is less sensitive to changes in current income.

With overlapping generations a regime change will have a gradual effect in the aggregate. To present a brief illustration of the transition, consider again

the simple numerical example in the previous section. When young households are given the opportunity to borrow as much as desired, they switch to the unconstrained consumption path (3, 3, 3). However, for the middle-aged and old households the liberalization has no effect on behavior since they have already been constrained from consuming as much as they wished when young, and are still following the constrained path of (1, 4, 4). Thus, aggregate consumption is $1 + 4 + 4 = 9$ in the constrained period, $3 + 4 + 4 = 11$ in the first period of the deregulation, $3 + 3 + 4 = 10$ in the next, and finally in the third period all generations are following the unconstrained consumption path yielding again $3 + 3 + 3 = 9$ as aggregate consumption demand.

In this simple exercise above, the constraints were only binding for young households as is commonly assumed. As argued in the previous section, Norway constitutes a special case because of the strong incentives to borrow in the pre-deregulation period. Consequently, constraints were possibly binding for both young and middle-aged, causing all households to act as current income consumers. A deregulation would then cause both young and middle-aged to switch to a path with higher consumption, while only the consumption of the old and retired would not react.

4 Young, middle-aged and old households

As discussed in the theoretical section, a deregulation of the credit market, unleashing pent-up demand for consumer durables would first of all affect young and middle aged households. It was argued that older households would not adjust their consumption since they are still following the constrained path.

Table 2 shows the outcome of estimating a general regression equation for the saving rate by age group. The dependent variable is saving minus housing expenditures as a fraction of labor income after tax. The variable is chosen because, as argued before, mortgage interest will be strongly affected by interest rate changes for many homeowners, while the corresponding positive yields from an interest rate increase is not included in the income concept. Young households are defined as households with heads between 20 and 39 years old, middle-aged as those between 40 and 65, and old as households with heads from 66 to 80 years old. The regression equation for the saving rate (sr) of household i in the sample year p , can be written

$$sr_p^i = k_0 + f(a) + \eta' D_p + X^i \beta + \kappa \frac{1}{y_p^i} + u_p^i \quad (10)$$

where k_0 is a constant, $f(a)$ is a function relating saving rate to age of the household head, D_p is a set of year dummies, and X are household specific variables we want to control for (employment status, area of residence, female head, number of household heads, number of children, homeownership, month of interview). Table 2 presents the estimated coefficients $\hat{\eta}$ associated with the period dummies. The full set of regressors are given in Appendix B. Since age is the grouping variable, it is here included linearly in the regression. The inverse of household labor income after tax (y_p^i) is included because by construction saving rates become increasingly negative as income diminishes, yielding extreme negative saving rates for households with incomes close to zero. The error term u_p^i is assumed to have a zero mean and a variance that is proportional to $1/y_p^i$

Table 2: Period dummies in saving rates eq. (11), two-stage WLS

	Age 20-39		Age 40-65		Age 66-80		All ages	
	Est.	SE	Est.	SE	Est.	SE	Est.	SE
1977	0		0		0		0	
1978	.021	(.022)	.038	(.016)	.058	(.024)	.038	(.012)
1979	.026	(.021)	.023	(.016)	.018	(.026)	.029	(.012)
1980	.036	(.021)	.047	(.018)	.059	(.030)	.045	(.013)
1981	.019	(.020)	.023	(.016)	.057	(.024)	.030	(.011)
1982	.030	(.020)	.062	(.016)	.033	(.025)	.050	(.011)
1983	-.026	(.019)	-.018	(.016)	.015	(.026)	-.013	(.011)
1984	.008	(.019)	-.021	(.016)	-.027	(.026)	.002	(.011)
1985	-.025	(.019)	-.010	(.016)	.031	(.024)	-.002	(.011)
1986	-.058	(.019)	-.049	(.016)	-.071	(.025)	-.048	(.011)
1987	-.042	(.020)	-.035	(.016)	-.034	(.024)	-.031	(.011)
1988	.070	(.019)	.037	(.015)	-.007	(.024)	.062	(.011)
1989	.041	(.020)	.009	(.017)	-.049	(.026)	.025	(.012)
1990	.037	(.020)	.016	(.017)	-.044	(.024)	.034	(.011)
1991	.020	(.020)	.013	(.017)	-.037	(.024)	.015	(.011)
1992	.027	(.018)	.016	(.015)	-.044	(.026)	.024	(.010)
1993	.028	(.018)	.056	(.015)	-.044	(.026)	.042	(.010)
1994	.033	(.018)	.039	(.015)	-.099	(.025)	.035	(.010)
adj R^2	.21		.17		.26		.18	
Breusch*	47		23		69		110	
$\chi^2(2)$	(<.0001)		(<.0001)		(<.0001)		(<.0001)	
Kolmog. [§]	.10		.10		.13		.10	
(p-value)	(.001)		(.001)		(.001)		(.001)	
No of obs	8655		10836		3542		23029	

*The Breusch-Pagan tests the null hypothesis of homoskedasticity in $(1/y_i, 1/y_i^2)$.

[§]The Kolmogorov-Smirnov tests the null hypothesis of normality of std residuals.

Table 3: Test* of difference between years

	Age 20-39	Age 40-65	Age 66-80	All ages
$\hat{\eta}_{1982} - \hat{\eta}_{1983}$	8.55	20.71	0.38	28.21
(Pr > F)	(0.0035)	(<.0001)	(0.5383)	(<.0001)
$\hat{\eta}_{1985} - \hat{\eta}_{1986}$	3.60	5.71	14.85	16.86
(Pr > F)	(0.0577)	(0.0229)	(0.0001)	(<.0001)

* F test of the null hypothesis that differences are zero.

squared until a threshold level. Therefore the method of regression is a two-stage weighted least squares where the first stage corrects for heteroskedasticity with the following weights

$$w^i = \begin{cases} y^2 & \text{if } y < \varphi \\ \varphi^2 & \text{if } y \geq \varphi \end{cases} \quad (11)$$

with $\varphi = 350000$ kroner, and the second stage trims the data for outliers with applying weights as follows

$$\tilde{w}^i = \begin{cases} 1 & \text{if } \left| \frac{r_i}{\sigma} \right| \leq 2 \\ 0 & \text{if } \left| \frac{r_i}{\sigma} \right| > 2 \end{cases} \quad (12)$$

where r_i is the residual from the first stage³.

4.1 Main regression results

According to tables 2 and 3, there is a statistically significant drop in saving rates for young and middle aged households between 1982 and 1983, but not for older households. The drop is 6 percentage points for young and 8 percentage points for middle aged (and no more than 1 percentage point for older households). As with the sample aggregate in section 2, the magnitude of the change seems to be enlarged by the fact that the estimates in 1982 are unusually high. An alternative is to compare with the period 1978-82, which is over all a stable period. Taking the estimate in 1983 together with the average of the preceding period we still find a significant drop, but now of 5 points for the young and 6 points for the middle-aged. All age groups show a further decline in saving in 1986, however, the drop is this time only statistically significant for households above 66 years of age. Looking at the consumption data, all age groups have very high consumption of durables in 1983, 1984 and 1985, cars in particular, and even for the very old. But as table 2 shows, the increase in durables relative to labor income is strongest for young and middle-aged. On the other hand, old households reduce their saving rates with 6 percentage points from 1982 to 1984, even though the year to year difference is insignificant.

The drop in saving rates for old households in 1986 is surprisingly large, 10 percentage points. I can think of two reasons for this. One is the omission of

³This method produces generally the same results as other methods of robust estimation, such as least absolute deviation (LAV) or least median squares (LMS), shown on the same dataset in Halvorsen (2002).

Table 4: Selected variables and dummies in saving rates eq. (11)

	Age 20-39		Age 40-65		Age 66-80		All ages	
	Est.	SE	Est.	SE	Est.	SE	Est.	SE
Age/10	-.029	(.008)	.047	(.005)	.104	(.012)	.030	(.002)
No of children	-.027	(.008)	-.076	(.007)	-.187	(.036)	-.071	(.004)
Single head	.225	(.016)	.245	(.016)	.178	(.016)	.210	(.010)
Mult. heads	-.014	(.022)	-.084	(.007)	-.051	(.012)	-.091	(.006)
Female head	-.002	(.009)	.018	(.010)	.054	(.014)	.021	(.006)
Self-employed	-.037	(.011)	.005	(.008)	-.002	(.017)	-.020	(.006)
Homeowner	.006	(.008)	-.021	(.009)	-.024	(.012)	-.012	(.005)
Spars. pop. area	.052	(.010)	.096	(.009)	.153	(.014)	.090	(.006)
adj R^2	.21		.17		.26		.18	
No of obs	8655		10836		3542		23029	

net capital income, which is known from income statistics is on average positive for households with heads older than about 50 years of age. Generally, the omission of net capital income gives saving rates for young households that are too high and saving rates of old households that are too low and the difference is increased after 1982 with higher interest rates. The omission of capital incomes is surely the main explanation of why the estimated time dummy coefficients for old households stay negative after 1986⁴. The other reason is that when interest rates go up, the user cost of housing will by definition go up. The substitution effect will shift consumption towards non-housing consumption. Higher user costs also constitutes a negative income effect, but in the case of older households this is probably small compared to the positive income effect of higher interest rates on financial wealth as discussed above (and income from housing).

4.2 Controls

Some selected controls are given in table 4, while the rest are given in appendix B. The estimates for the controls reveal a powerful impact of age and demographic composition of the household upon the saving rate. Saving decrease with age when in the young age-group, increase with age when in the middle-age-group and increase strongly with age in the oldest age-group (age effects versus birth cohort effects are discussed in more detail in Halvorsen, 2002). The number of children in the household has a significantly negative effect on household saving. Note that the coefficient increases with the age of the household, and thus age of the child. It seems that older children are more expensive. The dummy for single head has a surprisingly large positive coefficient in all age groups. Female head probably correlates with single head for old households,

⁴This effect is even more obvious when the results are grouped by households above and below 50 years of age. However, the main results do not change with another grouping of the age variable.

Table 5: Results with housing expenditures included, or simple OLS

	+ Housing expenditures			Ordinary Least Squares			
	20-39	40-65	66-80	20-39	40-65	66-80	All*
1981	-.016	.021	.072	.021	-.010	.004	.030
1982	.012	.061	.033	.037	.022	.042	.050
1983	-.068	-.028	.028	-.067	-.073	-.036	-.013
1984	-.058	-.047	-.022	-.007	-.073	-.107	.002
1985	-.094	-.043	.030	-.074	-.024	-.004	-.002
1986	-.131	-.090	-.110	-.093	-.060	-.088	-.048
1987	-.150	-.094	-.073	-.068	-.061	-.036	-.031
1988	-.029	-.018	-.032	.046	.024	.006	.062
1989	-.088	-.089	-.074	.040	.030	.015	.025
1990	-.079	-.067	-.088	.066	.064	.014	.034
Av SE [§]	.02	.02	.03	.04	.03	.06	.01
Adj R^2	.22	.19	.29	.40	.36	.49	.18
Dep mean	.09	.17	.34	.07	.15	.20	.31
Breusch. [†]				1534	2422	823	110
$\chi^2(2)$				<.0001	<.0001	<.0001	<.0001
Kolmog. [‡]				.14	.14	.16	.10
(p-value)				(.001)	(.001)	(.001)	(.001)

*From table (2); WLS excluding housing expenditures.[§]Since standard errors are approximately the same for all coefficients, only the average is reported.

[†]Breusch-Pagan test the null hypothesis of homoskedasticity in $(1/y_i, 1/y_i^2)$.

[‡]Kolmogorov-Smirnov tests the null hypothesis of normality of std residuals.

which may explain the positive coefficient. Self-employed head is significantly negative for young households (positive but not significant for the rest). The impact of region increase with age-group. For all households we have that a household in one of the major cities (Oslo, Bergen and Trondheim) has on average about 9 percentage points lower saving rate than a household with similar characteristics in sparsely populated areas. For old households the difference is 15 percentage points, while it is only 5 percentage points for young households.

4.3 Including housing expenditures

The dummy for homeownership in table 4 show that older homeowners save less and have higher non-housing consumption than younger homeowners. As mentioned before, positive capital income such as dividends and yields from financial wealth is not identified in the tax records used here, while the major part of negative capital income, interest on mortgages is reported in the household expenditure surveys as a part of housing expenditure. Thus, the point about young households having too high saving rates is illustrated in table 5, which shows the results when housing expenditures are included in the savings definition. We see that the saving rates of young households are lowered quite substantially compared to table 2 and declines after 1982. However, housing

expenditures increased for all age groups, affecting the coefficients of the period dummies. Housing expenditure correlates strongly with two other controls; region and homeownership. The difference in saving rates between households living in major cities and households living in scarcely inhabited areas is larger when housing expenditures are included.

4.4 Robustness of the results

Since the regression method used in estimating equation (11) gives little weight to low income household, the outcome is closer to a median regression rather than a mean regression. For comparison, table 5 presents the simple OLS estimates. The OLS results for coefficients accentuate the savings drop in 1983 and 1984, in particular for middle-aged households, but also for old households. On the other hand, standard errors are large and the heteroskedasticity tests reported in the lower part of the table show that the estimates are inefficient. The test statistics for the two-stage weighted least squares in the last column of the table indicate that heteroskedasticity is less. Also the normality test statistic (Kolmogorov-Smirnov) is somewhat reduced in the preferred regression method.

5 The wealth effect?

According to the life-cycle/permanent income theory, a forward-looking optimizing consumer will consume the annuity value of his human and non-human wealth. Non-human wealth is financial and real assets, and for most households, housing is by far the most important real asset. In an influential study, Muellbauer and Murphy (1990) argue that the increase in the average propensity to consume in the United Kingdom can be explained mainly by the surge in house prices in the mid-eighties coupled with the financial liberalization of the early eighties:

”with the sharp rise in house prices, residential property became more than half of personal sector wealth. Financial liberalization allowed households to cash it in as consumer expenditure financed by borrowing”. Muellbauer and Murphy (1990)

This view, coupled with the opinion that the housing market in the late 1980s was affected by irrational behavior and extrapolative expectations, implies that the high level of consumption was unwarranted and thus cause for concern for UK external equilibrium.

In the period 1985-87, and partly because of a deregulation of the housing market (see Moum, 1991, for details), we saw a sharp rise in Norwegian house prices. The growth in real house prices is shown in table 6. At the time there was no established price statistics, but a rough index was published by the Norwegian Association of Real Estate Agents (NEF)/Econ, and is presented in the first column of the table. The second column show the average per m² price statistics that eventually took over as the official statistic from NEF/Econ. The last two columns refer to calculations done by Moum (1989), who pointed out that the real house price appreciation was much stronger for houses with higher

Table 6: Real growth in house prices

	Index* 1980=100	Price* per m ²	Value of house in 1987-kr [§]	
			$\frac{1}{2}$ million	$1\frac{1}{2}$ million
1981	1	–	-9	-28
1982	-2	–	-6	-17
1983	-8	–	-6	-17
1984	-4	–	-4	-12
1985	11	–	6	18
1986	8	–	11	32
1987	3	13	5	14
1988	-1	-7	0	0
1989	-12	-16	–	–
1990	-11	-12	–	–

*Norwegian Association of Real Estate Agents (NEF)/Econ

§Moum (1989), growth given in 1000 1987-kroner.

real value (as measured in 1987). Although there are large differences between the measures, the boom in house prices in 1985 and 1986 is evident.

It can be shown that there are two effects of higher house prices on expenditure. One is a positive wealth effect for those with housing wealth, and the other is a negative price effect. A positive wealth effect can occur either through moving to a smaller dwelling, and thereby have an opportunity to consume out of realized capital gains, or through reversed mortgages, i.e. general loans backed up by housing collateral. The price effect is a combination of an income and substitution effect from facing higher user costs on housing. For those without housing wealth, there is no wealth effect so that the negative price effect dominates. Anyhow, we would expect to find a wealth effect for homeowners only, and the effect should be stronger for homeowners with relatively large dwellings, given that there is a strong correlation between the size and value of a house. On the other hand, one might expect non-homeowners to save more when real house prices rise. Their saving would also depend on the size of the required deposit as a proportion of the prize of a house when obtaining a mortgage.

5.1 Regression results

The regression result for the saving rate when housing expenditures is omitted, is presented in table 7. The regression is done for three subgroups, and homeowner households in dwellings larger than net 100m², homeowner households in dwellings smaller than or equal to net 100m², and tenant households. Net 100m² is the median size of all dwellings in the sample⁵. We see that with standard errors of approximately .02 there is no statistically significant difference (at conventional levels) between the owners and tenants. In particular, the decline in savings in 1985-87 does not seem to be stronger for owners with large dwellings. Actually, it is tenants who show the greatest drop in savings,

⁵I have experimented with other sizes as grouping criteria. The general result is that size correlates positively with saving rates, whereas the results concerning development over time does not change.

Table 7: Saving rate regressions by ownership and size of house

	Homeowners		Tenants	All
	100+	100-		
1977	0	0	0	0
1978	.050 (.019)	.028 (.021)	.010 (.019)	.034 (.011)
1979	.012 (.019)	.035 (.021)	.025 (.018)	.028 (.011)
1980	.048 (.021)	.036 (.023)	.048 (.020)	.046 (.012)
1981	.032 (.018)	.021 (.021)	.021 (.018)	.026 (.011)
1982	.057 (.018)	.017 (.021)	.057 (.019)	.047 (.011)
1983	-.028 (.018)	-.011 (.021)	-.003 (.019)	-.017 (.011)
1984	-.020 (.018)	.002 (.022)	.027 (.020)	-.005 (.011)
1985	-.003 (.017)	-.061 (.022)	.038 (.019)	-.011 (.010)
1986	-.041 (.017)	-.087 (.019)	-.099 (.020)	-.058 (.010)
1987	-.036 (.017)	-.033 (.020)	-.065 (.019)	-.039 (.011)
1988	.054 (.016)	.039 (.019)	.033 (.020)	.049 (.010)
1989	.016 (.017)	.002 (.020)	-.009 (.019)	.018 (.011)
1990	.023 (.017)	.027 (.020)	.053 (.019)	.020 (.011)
1991	.017 (.017)	-.015 (.021)	-.010 (.020)	.008 (.011)
1992	.035 (.016)	-.011 (.019)	-.026 (.018)	.017 (.010)
1993	.051 (.016)	.000 (.020)	.040 (.018)	.036 (.010)
1994	.031 (.015)	.011 (.020)	.054 (.020)	.028 (.010)
Adj R ²	.24	.27	.23	.19
No of obs	10577	6368	5158	23041

Standard errors in parenthesis.

or increase in non-housing consumption, in this period. According to the estimates, their saving rates fell on average by 14 percentage points. On the other hand, owners with large dwellings display the largest drop in savings in 1983, a period with apparently stable house prices. Owners with smaller dwellings have the largest consumption response in 1985-87. The fact that tenants increase their non-housing consumption more than homeowners in 1986 suggests that the house price effect was not very strong.

According to the wealth effect hypothesis, we expect a decrease in the value of housing to reduce consumption symmetrically. The subsequent decline in house prices in 1989-92 should imply reduced consumption and higher savings for homeowners (and more for homeowners with large dwellings). The estimates do not indicate any such response in the years 1989-92. In this period there are no particular changes in saving rates over time and across groups. Neither is there any decline in saving rates in 1993-94, when house prices started to grow again.

5.2 Consuming out of capital gains on housing?

To what degree do people "cash in" capital gain on housing? Young and middle-aged households will most likely use any gains to invest in a bigger dwelling, thus incurring higher user costs on housing and possibly a temporary increase in purchases of durables. Older households are likely to be in a position to sell and downsize, and use the capital gain on consumption of non-housing items. Yet, we know by experience that older households experience large transaction costs connected with moving and also do not see the need for using the extra gain on own consumption⁶. They would rather see the increase in wealth as extra security and higher value of a possible bequest. Also, what is a gain from rising house prices for some will be a loss for others (first-time buyers or younger households that feel they should save in order to acquire a house later) so theoretically the effect on the aggregate is uncertain.

Based on the discussion above, we might expect to see the wealth effect to be indeterminate or positive for younger households, negative for middle-aged households, and slightly negative for old households. As seen from the regression results by age group in table 4, the dummy for homeowners has this expected effect, positive but insignificant for young households, significantly negative for middle-aged, and negative for older households (but only significant at the 10% level). However, we would also expect that a house price effect was a result of households moving. Although the data is not a panel, it does contain information on when the household moved into their current dwelling. I used this information in order to restrict the sample to households who had stayed in the same house since 1982. Empirically, omitting from the sample those who have moved after 1982 does not change the main results. The only change is in 1986-87, a slight decrease in saving rates for the less than 100m² homeowners, and a slight increase in saving rates of tenants. Such small changes in the results do not support the "cashing in" or even "settling in" effect of increased housing wealth.

⁶For a study on US data, see Venti and Wise (2001) who conclude that, on average, home equity is not liquidated to support non-housing consumption as households age.

5.3 Reversed mortgages

Reversed mortgages is the way to consume out of increased housing wealth without moving. According to Muellbauer and Murphy (1990), reversed mortgages was important in explaining the UK consumption boom because increased availability of reversed mortgages, in particular for older households, was one of the factors in the financial liberalization. In one of the few papers that use micro data, Attanasio and Weber (1994), find that the house price explanation accounts for much of the increase in consumption of older cohorts, but they argue that most of the increase in macro consumption in the UK was due to younger cohorts with revised perception of life-time labor income. In section 4.1. I discussed the surprisingly large drop in saving rates for old households in 1986. Reversed mortgages may explain much of the shift down in non-housing consumption of older households in 1986-87.

5.4 Causality and data problems

A problem with interpreting the drop in savings as a wealth effect is the issue of causality. Consider that increased credit supply leads to temporary readjustment and increased demand for durables, and housing, in particular, among young and middle-aged households. An increase in consumption demand leads to an increase in the prices and values of assets whose supply is rather inelastic, such as housing prices and housing wealth. This appears in the data as a statistical correlation, but does not necessarily justify a causal relationship from housing wealth to consumption. On the basis of Norwegian National Accounts data, this has already been argued by Skjæveland (1989) and Magnussen and Moum (1992) in response to the arguments in favor of the house price hypothesis provided by Brodin (1988), Brodin and Nymoene (1989b), and Jansen (1992). Magnussen and Moum (1992) also point to the fact that there are essentially no good data on house prices in the 1980s. Statistics Norway did not begin to publish independent price statistics by region and type of dwelling until 1991. Table 6 show that there are considerable differences between the available price indicators.

6 Permanent income expectations

In section 3 it was shown that a transition from credit constrained to an unconstrained regime would induce an increase in the consumption of the young (and middle-aged, depending on the nature of rationing), but no increase in the consumption of the old. A similar pattern will emerge in the case of expectations about higher permanent income. According to the permanent income hypothesis, consumption will be proportional to the annuity value of the sum of nonhuman wealth and the present discounted value of expected future income. If income is expected to rise, and the permanent income hypothesis is true, consumption should rise now, financed by borrowing or running down assets, so that in either case net assets should fall. It can be shown within the framework of a simple life-cycle model (as it has been shown by Attanasio and Weber, 1994), that expectations about a permanent increase in lifetime income will have a larger effect the younger the household since they will have more periods of expected higher income to consume out of than an older household.

Attanasio and Weber (1994) use this argument to show that the British consumption boom in late 1980s can be explained as expectations about higher income⁷. Linking several cross-section by cohort they argue against the wealth effect hypothesis by showing that after several dummies for housing wealth is included, much of the consumption increase is explained for the older cohorts but remains unexplained for younger cohorts.

There is little explicit information about people's income expectations, and none on the expectations of Norwegian households in the mid-eighties. The ex-post development in real income provides little basis for expectations ex-ante. Considering the general economic situation, we know that growth in GDP was very high (above 4 percent) in the period 1983-86; unemployment was gradually declining since the beginning of 1983 (not increasing until 1988) and was historically low in 1986 and 1987. Much of this prosperity was due to high oil prices - Brent Blend was at 30-40\$ per barrel throughout the period 1979-85. Whether Norwegian households perceived this period of opulence as permanent or transitory is a question of people's understanding of the economy and the way they form expectations about the future, but it is reasonable to expect that Norwegian households were pretty optimistic and had high hopes for the future. In view of the description of the economy above, such optimism could contribute to a consumption boom in both 1983-84 and 1985-87, but most likely in the latter period despite the oil shock of 1986.

In 1981, the Labor Party initiated a relief in income taxes, an initiative that naturally was continued when the Conservative Party went into government later that year. According to Bowitz and Hove (1996), marginal income taxes were reduced from 44 percent to 38 percent, while average income taxes were reduced from 27 percent to 23 percent from 1981 to 1984 (in 1988 both were back at the 1981-level). Thus, both marginal and average income taxes were significantly reduced, but marginal taxes were reduced more than average taxes. It is not impossible that households perceived this tax reduction as a permanent change that would give permanently higher after tax income. The tax relief came earlier than the general economic boom, thus making it more likely to have contributed to consumption growth in 1983.

Though the hypothesis that permanent income expectations caused the consumption boom is plausible, and certainly did contribute to the overall increase in consumption, it is difficult to assess the hypothesis empirically and it is considered beyond the scope of this paper to do so. Likewise, there may have been speculation, irrational behavior and bandwagon effects during the boom. On the other hand, such phenomena are usually characteristics of the later part of economic booms, and it is my opinion that they do not interfere with the conclusions considering the early part of the consumption boom.

7 Conclusion

In this paper I argue that there was a particular situation in Norway prior to the liberalization in the 1980s, because Norway had a long history of regulated, low interest rates, extensive direct regulation of private banks, as well as regulation of international capital movements. At the same time, a combination of negative after-tax real interest rates and full tax deductibility for mortgage interest

⁷See also King (1990) and Pagano (1990).

made it optimal for all households to borrow. These borrowing incentives were to a large extent mitigated by credit rationing. According to theory, it is likely that young and middle-aged households were those primarily affected by credit constraints and would be more affected by deregulation than older and retired households. I find that micro data support the hypothesis of a temporary readjustment following financial deregulation. According to the data the decline in saving started in 1983, a couple of years earlier than previously thought on the basis of National Accounts data. The decline was caused by an exceptional increase in expenditure on durables in 1983-85. The micro data show that it was primarily young and middle-aged households who increased their consumption in the "first" part of the consumption boom (1983-85), while all households shows high non-housing consumption rates in the "second" part of the boom (1986-87). The rise in house prices in 1985-86 may have been an important determinant of older and retired households' consumption in the 1986-97 through reversed mortgages, but cannot on its own explain the decline in savings and boom in durables purchases that started in 1983.

A Appendix: Detailed description of the data

The main data source is the Norwegian Survey of Consumer Expenditures (SCE). The Survey of Consumer Expenditures is an annual survey based on two weeks of expenditure accounting, with additional interviews. The interviews collect information on household characteristics, such as age and employment status of all members of the household, and expenditures that may not be properly covered by a two week accounting like durables and annual expenses. Thus total consumption expenditure consists of payments of the household during the accounting period, converted to figures for a whole year through multiplying with 26, together with the housing expenses and consumer durable purchases recorded in the interview. A household is defined as persons having a common dwelling and sharing at least one meal per day. Institutions are not included. Sample weights are based on non-response rates by region, household size, and time of interview.

To the survey I have added income data from tax records. The tax records from this period have information on net income after deductions in income (thus yielding the tax base), and taxes. It is not possible to correctly identify net income before deductions. However, the tax record do have information about labor income (including labor income from self-employment) and pensions. The definition of saving is therefore

$$\text{Saving} = (\text{wage income} + \text{income from self-employment} + \text{pensions} - \text{taxes}) \\ + \text{imputed transfers} - \text{total consumer expenditures.}$$

Imputed transfers are child benefits and student scholarships. Number and age of children is used to calculate child benefits, and if there are full-time students in the household, these are assumed to have a full student scholarship. If we had been able to do identify net capital income, it would for most households consist of dividends from financial wealth and interest paid on mortgages. In the household survey data, consumption of housing services generally consists of interest paid on loans/mortgages, rent, fuel, and maintenance. So, interest paid on mortgages is part of the expenditures definition and thus already registered. Moreover, the corresponding positive income from real wealth, i.e. imputed income from owner occupied housing, is inadequately registered for tax reasons.

A source of variation is the lack of exact correspondence between income and consumption. While income refers to the year of observation, consumer expenditures depends on when the household has been interviewed. In the interview, questions about expenditures on durables are phrased "purchased in the past 12 months". An interview done in January will record expenditures on durables in the current year that were actually made in the year before. A correspondence problem is also attended with the procedure of "blowing up" two weeks of expenditures that the interviewed households have accounted for to one year. Households interviewed in December will in most cases yield an observation of a much higher yearly expenditure, when the two weeks are multiplied by 26, than other households with the same yearly income interviewed at an earlier date. As a consequence, dummies for month of interview has been included in the regressions.

Table A.1 Household saving rates

	Mean			S/Y	S/Y excl. housing	No of obs.
	$(\bar{s}r)$	Std. dev.	Median			
1975	-0.74	7.56	0.12	-	-	1036
1976	-0.52	6.76	0.15	-	-	1076
1977	-0.69	7.18	0.10	-	-	921
1978	-0.56	5.50	0.17	0.09	0.20	1396
1979	-0.31	3.31	0.16	0.10	0.21	1368
1980	-0.11	1.78	0.14	0.09	0.22	1046
1981	-0.33	7.25	0.18	0.11	0.23	1448
1982	-1.05	15.76	0.19	0.14	0.25	1380
1983	-0.40	4.18	0.12	0.05	0.17	1406
1984	-0.65	6.46	0.10	0.03	0.18	1396
1985	-0.41	5.43	0.11	0.04	0.19	1425
1986	-0.86	18.06	0.07	-0.02	0.14	1416
1987	-0.22	1.96	0.07	0.00	0.18	1208
1988	-0.05	1.27	0.19	0.07	0.26	1379
1989	-0.01	0.85	0.13	0.05	0.26	1171
1990	0.02	0.74	0.15	0.09	0.28	1201
1991	-0.12	1.37	0.10	0.04	0.26	1284
1992	0.01	0.64	0.13	0.09	0.29	1387
1993	0.02	1.11	0.18	0.16	0.33	1306
1994	0.04	0.95	0.20	0.17	0.33	1334

Source: Author's calculations using the SCE and tax records

Table A.2 Real income and expenditures, in 1998-kroner.

Year	Labor income after tax*		Consumer expenditures						No of obs.
	Mean	Median	Total		Durables		Housing		
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	
1978	199289	185688	180234	150409	29018	22793	21173	19647	1396
1979	199833	186503	180733	151560	25902	18358	23006	20822	1368
1980	199027	185851	180702	150673	25683	20064	25403	22123	1046
1981	209255	201316	185488	158755	26238	19514	24597	23020	1448
1982	208390	195547	178500	159933	24154	23156	23164	24935	1380
1983	207852	193946	197987	171802	59398	53483	25442	26685	1406
1984	211353	195741	202870	172015	52213	41782	28928	27859	1396
1985	219303	207764	209794	179872	56338	45064	32346	30242	1425
1986	215060	204581	219381	186673	37437	29391	36694	33606	1479
1987	222067	209574	222042	190599	36845	36112	40545	35152	1481
1988	249544	229464	219539	184755	28043	22664	45895	40571	1417
1989	225379	212264	213036	183561	24562	22699	46446	44443	1171
1990	227142	207299	207387	176879	23082	20749	44780	40735	1201
1991	222322	201931	219542	186173	26124	19441	46772	47316	1284
1992	244854	226438	221669	187883	24368	20030	48099	43551	1387
1993	252767	225301	212797	182643	25393	24007	43667	42446	1308
1994	261302	238511	218172	186954	26229	19955	43049	39891	1334

* Labor income including pensions.

Table A.3 Real income and expenditures, index 1978 = 100

Year	Labor income after tax*		Consumer expenditures					
	Mean	Median	Total		Durables		Housing	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
1978	100	100	100	100	100	100	100	100
1979	100	100	100	101	89	81	109	106
1980	100	100	100	100	89	88	120	113
1981	105	108	103	106	90	86	116	117
1982	105	105	99	106	83	102	109	127
1983	104	104	110	114	205	235	120	136
1984	106	105	113	114	180	183	137	142
1985	110	112	116	120	194	198	153	154
1986	108	110	122	124	129	129	173	171
1987	111	113	123	127	127	158	191	179
1988	125	124	122	123	97	99	217	207
1989	113	114	118	122	85	100	219	226
1990	114	112	115	118	80	91	211	207
1991	112	109	122	124	90	85	221	241
1992	123	122	123	125	84	88	227	222
1993	127	121	118	121	88	105	206	216
1994	131	128	121	124	90	88	203	203

*Labor income including pensions.

B Appendix: Regression results for all controls

	Age of household head			
	20-39	40-65	66-80	All
Intercept	.552 (.023)	.537 (.019)	.359 (.043)	.553 (.012)
$1/y_i$	-89312	-77514	-61023	-71229
Age/10	-.029 (.008)	.047 (.005)	.104 (.012)	.030 (.002)
No of children	-.027 (.008)	-.076 (.007)	-.187 (.036)	-.071 (.004)
(No of children) ²	.001 (.001)	.008 (.001)	.031 (.018)	.008 (.001)
Single head	.225 (.016)	.245 (.016)	.178 (.016)	.210 (.010)
Multiple heads	-.014 (.022)	-.084 (.006)	-.051 (.012)	-.091 (.006)
Female head	-.002 (.008)	.018 (.0010)	.054 (.014)	.021 (.006)
Self-employed head	-.037 (.011)	.005 (.008)	-.002 (.017)	-.020 (.006)
Self-employed spouse	.008 (.015)	.014 (.012)	-.011 (.025)	.009 (.009)
Rural area (spars.pop.)	.052 (.010)	.096 (.009)	.153 (.014)	.090 (.006)
Rural area (dens.pop.)	.007 (.008)	.040 (.007)	.084 (.012)	.030 (.005)
Homeowner	.006 (.008)	-.021 (.009)	-.024 (.012)	-.012 (.005)
January	.119 (.014)	.097 (.013)	.104 (.022)	.110 (.009)
February	.061 (.015)	.067 (.013)	.064 (.023)	.063 (.008)
March	.073 (.015)	.048 (.013)	.054 (.024)	.058 (.009)
April	.047 (.015)	.070 (.013)	.089 (.023)	.063 (.009)
May	.028 (.015)	.011 (.013)	.061 (.024)	.026 (.009)
June	.007 (.015)	.006 (.013)	.003 (.024)	.006 (.009)
July	.007 (.015)	.011 (.013)	.001 (.023)	.009 (.009)
August	0	0	0	0
September	.009 (.015)	-.012 (.013)	-.016 (.023)	-.003 (.009)
October	-.010 (.015)	-.023 (.013)	-.017 (.024)	-.018 (.009)
November	-.009 (.015)	.011 (.013)	.021 (.024)	.005 (.009)
December	-.173 (.016)	-.117 (.014)	-.083 (.024)	-.128 (.009)
Dummies for year	All reported in table (2)			

Standard errors in parenthesis. The dummies are normalized on a household with two adults and a male household head, one who is a wage earner, and resides as a tenant in one of the major cities (Oslo, Bergen or Trondheim), and doing the the two weeks of consumer expenditure reporting in August.

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