Erkki Koskela* — Matti Virén**

Bank of Finland Research Department
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Inflation, Capital Markets and Household Saving in Nordic Countries

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* Department of Economics, University of Helsinki, Aleksanterinkatu 7, 00100 Helsinki, Finland
** Department of Economics, University of Turku, 20500 Turku, Finland.
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Contents

Abstract

Household saving ratios in the Nordic countries are very low by international standards and have declined markedly during the 1980s. Aggregate quarterly time-series data for the period 1970–1989 are used to study the development of household saving behavior over time. The evidence suggests that the household saving ratio responds positively to both the inflation rate and real income growth. There is also some weak evidence to support the view that the rate of change in real housing prices has a negative effect on household saving ratios.

1 Introduction

There are two features in the household saving ratios in Nordic countries. First, by international standards, the Nordic countries are "low" savers and second, household saving ratios have markedly declined during the 1980s. As for the first question, the standard approach has been to use the life cycle hypothesis of saving (LCH) to explain cross-country differences in the average household saving ratios. The early tests of the LCH — using data from the 1950s — to account for inter-country differences in the average private and household saving ratios were successful, but using more recent data from the 1970's and 1980's they have been less so (see e.g. Koskela and Virén, 1989). While one may discuss reasons for the mixed and relatively poor performance of the LCH in the context of cross-country data like measurement problems, different accounting practices etc., one should also question the underlying assumptions.

Standard formulations of LCH abstract from potential capital market imperfections and taxes. With perfect capital markets households can dissave and borrow within the bounds of solvency at the same interest rates at which they can save and lend. For various reasons, however, borrowers may be subject to binding borrowing constraints. Also casual observation suggests that liquidity constraints are a fact of life for many households. As for the taxes, both their level and structure are hugely different across countries and they can be argued to affect incentives to borrow and save and thereby household saving ratios.

Turning to the development of household saving ratios over time, the "low" Nordic household saving rates have declined markedly during the 1980s, to the point that the household saving ratio as defined by the national accounts has occasionally turned negative in Denmark, Finland, Sweden and Norway. This change in saving behaviour happened simultaneously with the liberalization of financial markets (for a description of financial market liberalization in Nordic countries, see Lehmussaari, 1990b).[1)] Therefore, it is natural to try to connect the change in saving behaviour with the liberalization. This conclusion may, however, be premature. Other variables like inflation rate, real income growth rate and interest rates changed as well and may be able to account for changes in saving behaviour.

Financial market liberalization was associated with rising housing prices and housing wealth in Nordic countries. More generally one could argue that windfall gains (losses) in housing prices cause declines (upturns) in household saving. One objection to this explanation is that a shift in the relative price of housing need not affect aggregate saving. Any relative price increase implies that some gain (those selling the good), while others loose (those buying the good). Anyway this suggests that it might be useful to analyze household saving behaviour and housing within a unified framework.

The purpose of this paper is to use aggregate quarterly time-series data from Denmark, Finland, Norway and Sweden over the period 1970–1989 to study household saving behaviour. We start by looking briefly at the issue of why household saving ratios are comparatively "low" in Scandinavian countries. The main focus of attention of the empirical part of the paper concentrates, however, on time-series evidence on household saving ratios. We estimate first the kind of household saving functions, which were reasonally successful in the 1960s and 1970s in order to see how well the "old" specifications work under somewhat different economic conditions and institutional circumstances and then move on to account for the interaction between household saving and housing markets and for the potential role of interest rates and taxes.

The paper proceeds as follows. In section 2 a framework for empirical analysis is presented starting from a basic saving function and extending it to allow for housing market, interest rates and taxation. Section 3 presents data to be used, discusses briefly the issue of the level of household saving and concentrates on the time-series analysis of household saving behaviour in Nordic countries.

2 Household saving: framework for empirical analysis

During the 1970s and early 1980s a considerable amount of effort was spent in analyzing the relationship between inflation and household consumption and saving behaviour. It was observed that high rates of inflation tended to be associated with high rates of personal savings in OECD countries. As usual in economics, numerous hypotheses were proposed to explain this phenomenon. One explanation was put forward by Deaton (1977). According to his misperception hypothesis households may not have sufficient information to distinguish between relative and general price movements. If so, unanticipated inflation is misinterpreted as the rise in relative prices of goods households are currently buying, so that real saving increases. If one is prepared to assume constant income and inflation expectations, then one ends up with the following basic specification:

$$s_t = a_0 + a_1 s_{t-1} + a_2 y_t + a_3 p_t + u_t \qquad (1)$$

where s is the households' saving ratio, y the real income growth rate, p the inflation rate and u the error term. One may expect that a_1, a_2, a_3 are between zero and one so that the savings ratio adjusts partially and the "surprises" in inflation and real income will affect positively the saving ratio.

The observed relationship may largely be a statistical mirage, however. This is basically because income, as measured in national accounts, includes interest payments on financial assets, which is not really income at all during inflation. Thus measured saving, which is the difference between measured income and consumption, tend to rise with inflation. In the empirical section we analyze a bit what is the proper interpretation of inflation.

Earlier we noticed that financial market liberalization was associated with rising housing prices in Nordic countries. Since housing wealth is widely distributed across the population and for many households the most important form of wealth, it is important to analyze interactions between saving behaviour and housing. Elsewhere, we have developed a simple three-period model to illustrate the potential interaction between saving, capital markets, interest rates, relative price of housing and inflation (see Koskela and Virén (1991) for details). The qualitative features of the model can be briefly characterized as follows. One result is that the household saving ratio is positively associated with the binding downpayment ratio. This is important at least for two reasons. First, countries seem to differ in terms of downpayment ratios: Japan and Italy, that have the high (see Boleat (1987)) downpayment ratios also happen to be "high" savers. Second, an aspect of financial market liberalization was that housing loans could be obtained at the lower downpayment ratios than earlier. This is consistent

with the negative relationship between saving and increased liberalization. Moreover, one can show that the higher price of owner-occupied housing the higher the saving of those households, who plan to purchase. On the other hand, if the downpayment ratio is binding, the future selling price (the expected capital gains from housing) affects neither consumption nor saving, but in the nonbinding downpayment case the future selling price can be shown to have a negative saving effect. Finally, one can decompose the interest rate effect into offsetting substitution and income effects leaving the total effect ambiguous a priori.

Earlier considerations suggest that in addition to the usual variables the downpayment ratio, the relative price of housing and the real (or nominal) interest rate might affect household saving behaviour.[2] It is here that taxation might play its role mainly due to the deductibility of interest rate expenses in taxation. Unfortunately we do not have time-series data on downpayment ratios so that we write the augmented specification for the household savings ratio s as follows

$$s_t = a_0 + a_1 s_{t-1} + a_2 y_t + a_3 p_t + a_4 ph_t + a_5 i_t + a_6 T_t + u_t \qquad (2)$$

where ph = the rate of change of the real housing price, i = the nominal interest rate, and T is the (average) marginal income tax rate. In the specification one may expect that $a_4 < 0$ if capital gains dominate capital losses, while a_5 and a_6 are ambiguous. If the (average) marginal income tax rate affects saving only via the tax deductibility of interest rate expenses, then the two last terms collapse to $a_5(1-T_t)i_t$ and $a_5 > 0$. There is no reason, however, to suppose that the tax deductibility is the only channel of influence of T_t.

3 Empirical results

3.1 Some descriptive statistics

Before we turn to the empirical analyses with time-series data it is useful to go through some descriptive data for the four Nordic countries in terms of household saving behaviour and some of their likely main long-term determinants. Households' net saving rates for these countries are displayed in Figure 1 (together with housing prices). As we noticed earlier, two obvious facts merit note with these saving rates: first, the overall level is rather "low" and, secondly, the saving rates experienced a dramatic fall towards the end of the 1980s. In fact, in all sample countries negative saving rates can be occasionally discerned.

To start with, we first present some aggregate data over the 1985–1989 period both for the four Nordic countries and for the rest of the OECD in Table 1. Table 1 suggests that, except for Norway, the "growth rate effect" — so celebrated in the seminal formulation of LCH — may not provide much help in the explanation of "low" saving ratios in Nordic countries. However, for most of the other variables there is a rather clear difference between the Nordic countries on the one hand and the rest of the OECD on the other hand. This is true for the size of the public sector, social security expenditures, population aged 65 and over as percentage of total population and current transfers as a fraction of GDP. The Nordic countries are characterized by a high ratio of elderly people and high social security expenditures and transfers, which should have a negative effect on the household saving ratio. The insurance role of the government proxied by these variables seems to be higher in Nordic countries. Finland, however, seems to be an exception; its values are rather close to the OECD average values, though the saving ratios in Finland and the rest of OECD differ dramatically. Finally, the size of consumer credit markets in Nordic countries seem to exceed the OECD average. This conforms with the view that Nordic capital markets are more developed than those of other OECD countries.

It can be argued (Deaton (1991)), that under income uncertainty borrowing constraints and other capital market imperfections tend to increase saving, ceteris paribus. Thus the earlier observations suggest that very low saving rates in the Nordic countries may reflect the absence of borrowing constraints or other capital market imperfections and the high insurance role of government.

A way to evaluate whether the low-saving rates reflect absence of capital market imperfections is to estimate the Euler equations suggested by Campbell and Mankiw (1990) and to test for the significance of the income term. The estimating equation is $\Delta c_t = \alpha + \lambda \Delta y_t + u_t$. The size of the income coefficient can be interpreted as the fraction of constrained consumers (or so-called "rule-of-thumb" consumers). The Instrumental

Table 1. **Some descriptive data for the Nordic countries**

	s	b	Δc	r	DEP	RET	SOS	Δy	tr	G
Denmark	0.7	37	1.4	6.8	18.1	15.2	27.7	2.5	18.7	57.2
Finland	1.2	39	4.3	4.3	19.4	12.7	21.9	3.7	12.9	40.3
Norway	-3.8	48	1.9	6.7	19.7	16.0	29.9	0.7	17.4	54.4
Sweden	-3.5	39	3.1	5.9	18.0	17.5	29.5	2.7	20.7	60.6
Rest of OECD	11.8	14	3.5	5.1	19.8	12.9	19.2	3.2	13.5	36.5

All figures are percentage sample averages for the period 1985–1989 (RET, DEP, SOS and G are, however, derived from the period 1984–1988). s = households' net saving rate, r = the (ex post) real interest rate, DEP(RET) = population aged 0–15 (65 and over) as percentage of total population, SOS = social security expenditure as percentage of GDP, tr = general government current transfers (escl. subsidies)/GDP, and G = total government receipts as percentage of GDP, Δc = rate of growth of private consumption and Δy = rate of growth of households's real disposable income. Rest of OECD denotes unweighted average for 14 OECD countries not including the Nordic countries. In the case of Δc, Δy, and G, however, it denotes total OECD. b = consumer credit as a percentage of consumers' spending in 1988 (sources: Giavazzi and Pagano (1990), Guiso and Jappelli and Terlizzese (1991)).

Variable (IV) estimation results for the coefficient λ are: Denmark -.019 (0.09), Finland .272 (0.97), Norway -.023 (0.03) and Sweden -.006 (0.07), where numbers in parentheses are t-ratios.[3]

To a large extent the results are consistent with the hypothesis that low saving rates reflect absence of borrowing constraints; the estimates of λ are indeed rather low for Denmark, Norway and Sweden, and perhaps also for Finland, considering that the coefficient is not significantly different from zero. (See e.g. Campbell and Mankiw (1990) and Jappelli and Pagano (1989) for comparable international evidence). Concluding, both the informal evidence on the insurance role of government and on the extent of consumer credit markets as well as the estimates of the excess sensitivity parameter λ go a long way to provide an explanation to the low saving ratios in the Nordic countries.

3.2 Inflation, housing prices and saving ratio: nordic countries

We continue the empirical analysis by estimating the household saving function specification (2) without the interest rate and tax factors for Denmark, Finland, Norway and Sweden for the period 1971Q2–1989Q4.[4] In the first place, we are interested in the performance of the "old specification" (1) given the changes in institutions and economic conditions which have taken place in these countries in the 1980s. The equations were first

estimated by OLS but it turned out that the OLS estimator is not efficient. Thus, estimation was then carried out by using the SUR estimator. The respective results are reported in Table 2.

The results indicate that the basic (i.e. Deaton's) saving function specification (1) performs rather well. The explanatory power of the respective estimated equations is fairly good for all countries, the coefficients have in all cases the expected sign and, moreover, they have been estimated rather precisely. According to the estimation results both income growth and inflation tend to increase household saving.[5]

As far as house prices are concerned, the evidence is a bit mixed. This is something one might expect given the difference between countries in the way house prices have behaved during the sample period. These differences can be seen from Figure 1 in which both the household saving ratios and the real house prices are graphed. These differences show up in the estimation results. Although the house price effect is systematically negative if the inflation variable is not allowed to enter the equation, the more general specification which includes both the inflation rate and the rate of change in the real house prices does not imply a significant negative house price effect for all countries. In fact, such an effect can be discerned only for Finland and Norway.

An obvious problem with the real housing prices is their potential endogeneity in terms of households savings ratio. We studied this possibility a bit by calculating the cross-correlation functions between the household saving ratios and rate of change in real housing prices for all countries. With all countries, the rate of change in real housing prices led rather than lagged the household saving ratios (the lead being between 2—6 quarters). Although the estimating equations here include the house price variable an almost identical result was obtained when this variable was replaced by the housing wealth variable. It is only that the explanatory power of the equations slightly decreased; the value of the maximized log likelihood function for the whole sysem of equations is 885.056, slightly less than the corresponding tabulated value for the equation with the house price variable (i.e. 885.410). When evaluating this result we should keep in mind that conventional measures of the housing stock are very much trend-like and thus the changes in housing wealth are clearly dominated by fluctuations in house prices.[6]

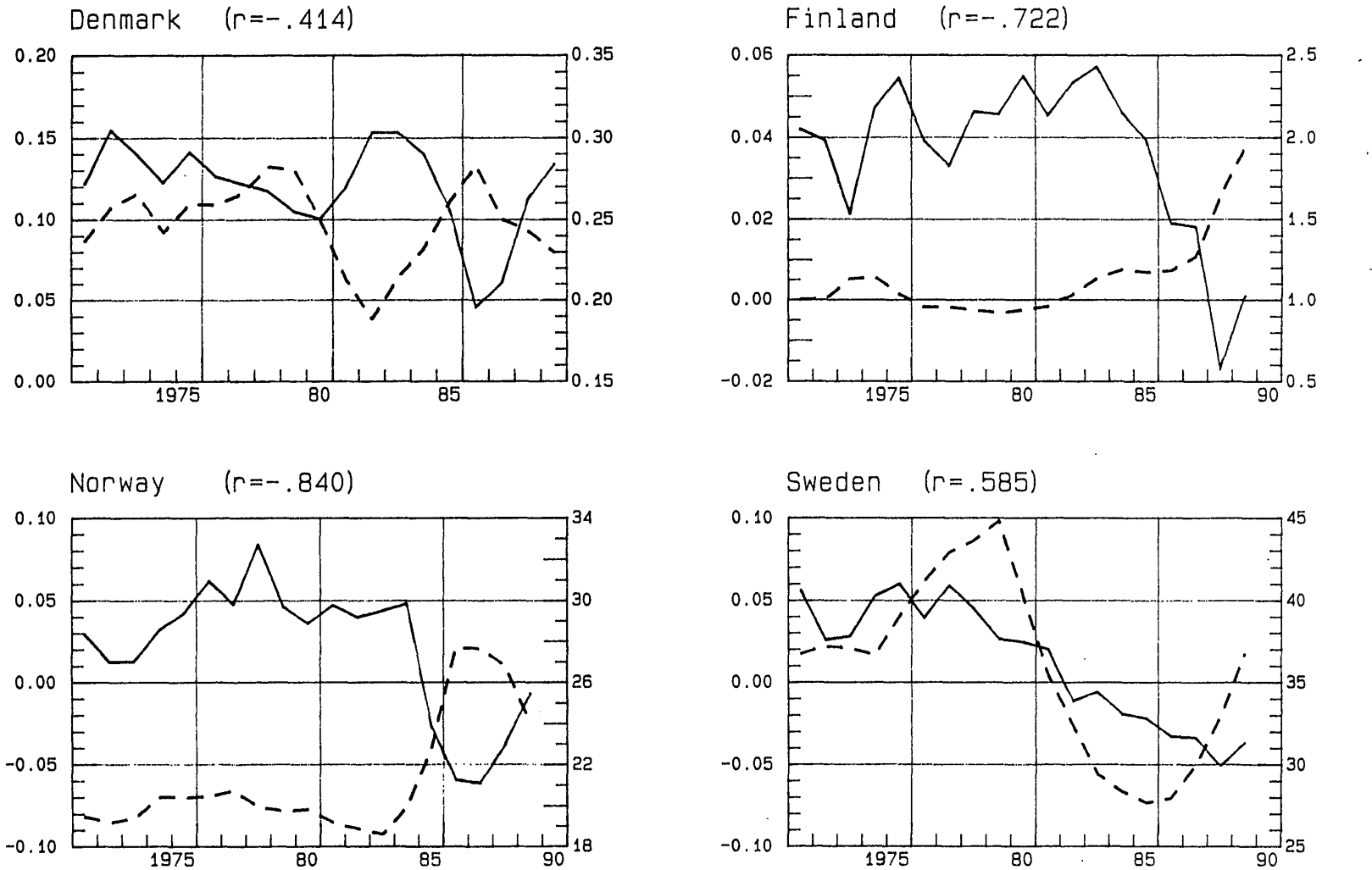
Even though the results are relatively good, the coefficient estimate of inflation is rather high for all other countries except Finland, particularly if it is compared with those obtained by Deaton (1977) for U.S. and U.K. One should point out, however, that the interpretation of the inflation rate is not fully clear, though our preliminary tests suggest that the hypothesis according to which only unanticipated inflation matters should be considered with some suspect (see Koskela and Virén (1991)). What is the reason for these high inflation rate coefficients is not totally clear and should be subject for further research.

Table 2. **SUR Estimation results for the Nordic countries**

	D	F	N	S	D	F	N	S	D	F	N	S
Const.	.017	-.003	-.016	.021	.031	.002	.002	-.002	.018	-.001	-.014	-.023
	(2.32)	(0.86)	(3.98)	(5.88)	(3.48)	(0.73)	(0.83)	(1.31)	(2.30)	(0.37)	(3.60)	(5.40)
y	.644	.451	.427	.978	.576	.461	.423	.917	.641	.459	.458	.977
	(10.21)	(4.38)	(3.88)	(23.80)	(7.86)	(4.59)	(3.57)	(19.88)	(10.16)	(4.62)	(4.34)	(23.72)
p	.985	.184	.832	.871					1.049	.166	.824	.930
	(5.55)	(1.61)	(4.40)	(5.48)					(5.44)	(1.50)	(4.57)	(5.19)
ph					-.074	-.051	-.138	-.083	.056	-.047	-.146	.038
					(1.03)	(2.26)	(2.38)	(1.26)	(0.85)	(2.10)	(2.82)	(0.58)
s_{t-1}	.672	.860	.862	.871	.728	.857	.856	.896	.651	.846	.856	.865
	(11.78)	(13.85)	(22.61)	(23.92)	(9.90)	(14.72)	(21.32)	(22.01)	(10.18)	(13.98)	(23.48)	(23.26)
R^2	.753	.749	.876	.912	.659	.753	.866	.883	.755	.761	.888	.914
100*SEE	1.657	1.059	1.448	1.275	1.946	1.052	1.510	1.473	1.650	1.071	1.379	1.267
D-W	2.220	2.134	2.096	2.482	2.534	2.103	2.397	2.166	2.143	2.174	2.333	2.484
$\hat{h}$	1.095	0.690	0.441	2.199	2.999	0.514	1.832	0.770	0.746	0.882	1.517	2.212
	χ_6 = 20.344 ln(L') = 878.437				χ_6^2 = 19.503 ln(L') = 853.065				χ_6^2 = 20.755 ln(L') = 884.059			

Numbers in parentheses under the estimates are (asymptotic) t-ratios. h denotes Durbin's h-statistic for first-order autocorrelation, χ_6^2 test statistic for diagonal covariance matrix and ln(L') the maximized value of the log likelihood function. D = Denmark, F = Finland, N = Norway and S = Sweden.

Figure 1 Household saving ratio (——) and housing prices (---)



Thus far we have neglected the effects of the interest rate and taxation. Can one detect a significant after-tax or before-tax nominal or real interest rate effect for these countries? The following Table 3 contains the t-test statistics for the additional interest rate and the (average) marginal income tax rate terms:

Table 3. **An analysis of the effects of interest rates and taxes**

Additional variables	t-tests in different country eqs			
(basic specification containing p)				
	D	F	N	S
Nominal Interest rate	-0.55	3.23	-0.69	-0.47
Real Interest rate	0.49	1.09	-0.31	-1.28
Real after-tax interest rate	1.29	-0.01	-0.07	-1.37
Marginal income tax rate	0.56	0.36	0.29	1.07
(basic specification containing ph)				
	D	F	N	S
Nominal Interest rate	1.20	2.78	-0.60	-0.13
Real Interest rate	0.83	0.01	-0.79	-1.77
Real after-tax interest rate	-0.22	-0.68	-1.03	-2.53
Marginal income tax rate	0.17	0.14	1.36	2.69

t-ratios are based on OLS estimation for period 1971Q2—1989Q4. The expected rates of inflation for the real interest rates were derived from ARIMA models reported in Koskela and Virén (1991).

The coefficients of the interest rate terms could not be estimated very precisely. As far as nominal interest rates are concerned, only in the case of Finland one can reject the hypothesis that the coefficient equals to zero. With real rates such a conclusion can be made at the 5 per cent level only in the case of Sweden if the inflation rate is not included in the model. The coefficient estimates of the marginal income tax variable (as a single additional explanatory variable) are all positive but the t-ratios are so low that one cannot really draw any strong conclusions on the role of the (average) marginal income tax rate.

What is the reason for this lack of uniformity cannot be said on the basis of the aggregated time series data. First, mixed results may have to do with measurement and simultaneity problems. It is not easy to judge what is the representative rate of return for the saving. And although interest rate may well affect saving, also saving shocks can affect interest rates for instance via the current account and the international capital markets. Second, there is no theoretical presumption about the sign of their

correlation. Changes in the real interest rate have both income and substitution effects and can increase or decrease savings depending on the balance between the two. Third, the marginal income tax rate may affect both via deductibility of interest rate expenses and via the rate of return on savings. Finally, the effect of interest rate changes on saving depends on the age distribution of population as well as on the distribution of financial assets by age group. An increase in the rate of return affects not just the return to current saving, but also the return to all stock of existing financial wealth. If a large share of this financial wealth is in the hands of older individuals, then the change in the real rate of return will increase the income of those very people who are likely to spend more. Via this mechanism the response of the aggregate household saving rate to the real interest rate might be negative (see Sheshinski and Tanzi (1989))[7]. Clearly, our findings are in line with an enormous body of research, which has failed to show any clear empirical relationship between the interest rates and saving ratio.[8,9]

4 Concluding remarks

As for the issue of why household saving ratios are low in the Nordic countries, the insurance role of government — measured in terms of social security expenditure and current transfers as a fraction of GDP —, the extent of consumer credit markets as well as the estimates of excess sensitivity parameter go a long way to provide an explanation.

Our main focus of interest in the empirical part has, however, been to explain time-series development of household saving over the two decades in the Nordic countries. We started by estimating the kind of household saving functions, which were reasonably successful in the 1960s and 1970s in order to see how well the "old" specifications work under different economic conditions and institutional circumstances of the 1980s. Results were relatively good, while not without problems, for the specification, according to which the saving ratio adjusts partially and responds positively both the inflation rate and the real income growth rate. There is also some weak evidence in favour of including the rate of change of the real housing price as an additional explanatory variable.[10] This means that falling inflation rates, rising real house prices (and housing wealth) — associated with the financial market liberalization — as well as falling real income growth have contributed to the decline in the household saving ratios during the 1980s with some modifications for Sweden. As for the role of the real (or nominal) interest rate and the (average) marginal income tax rate, the results were relatively unprecise and mixed across countries. What is the reason for this cannot be said on the basis of the aggregate time-series data.

Footnotes

1) Muellbauer and Murphy (1989) have argued that the decline in the UK saving ratio since 1980 is attributable to liberalization of financial markets.

2) Wilcox (1989) has argued that the nominal interest rate may matter. As the nominal interest rate increases, liquidity constraints both bind more tightly on previously constrained households and raise the number of constrained households. To the extent that financial institutions follow a practice of restricting borrowing so as to keep current payment-to-current income ratios below some ceiling level, then a rise in nominal interest rates tends to increase liquidity constraints and decrease consumption.

3) The list of instruments included Δy_{t-1}, Δy_{t-2}, Δc_{t-1}, Δc_{t-2}, Δi_{t-1}, Δi_{t-2}. The sample period was 1971Q2–1989Q4.

4) The data have been constructed for Denmark, Finland, Norway and Sweden. The sample period is 1970Q1–1989Q4. In the case of Denmark the sample period is, however, 1971Q1–1989Q4. The data are seasonally adjusted (the interest rate variables and the demographic variables are not, however, adjusted). The data have mainly been obtained from the respective central banks. In the case of Sweden the main data source is, however, the OECD Quarterly National Accounts. The demographic data are derived from the OECD Labor Force Statistics.

5) In order to evaluate stability of the saving functions we calculated the Chow-test statistics for all the equations in the Table 3, when these were estimated by OLS. With the exception of Norway the null hypothesis that the parameters are stable across the estimation period could be just rejected at the 5 per cent significance level. Lehmussaari (1990a) has earlier examined the household saving dynamics by using annual data over the period 1971–1985. He concluded that, with the exception of Sweden, for the other three countries structural changes have occurred in connection with the introduction of the financial market deregulation. Later research with the quarterly data and accounting for wealth (housing and liquid assets) variables has not supported Lehmussaari's results (see findings of Brodin and Nymoen (1989) on Norwegian data and Berg and Bergström (1991) for Sweden.

6) Recently, Brodin and Nymoen (1989) on Norwegian data, Berg and Bergström (1991) on Swedish data and Christensen and Knudsen (1990) on Danish data have stressed and shown the importance of (housing and financial) wealth variables in tracking household consumption behaviour in those countries during the 1980's. Our results conform both with these results and those reported by Muellbauer and Murphy (1989) for the United Kingdom.

7) In the case of Finland it turns out that there are striking differences between the age groups both in terms of their saving, on the one hand, and their assets and liabilities, on the other hand. In particular, younger households have negative, while the elderly positive saving in 1988. To be more precise, the following age profile of saving rates could be derived from Finnish cross-section data for households (the subsequent years refer to the age of the "head of household"): 15–24 years, -4 %, 25–34 years -2 %, 35–44 years -4 % 45–54 years -1 %, 55–64 years 12 % and 65 years and over 6 %. See Vilmunen and Virén (1991) for further details.

8) Given the declining household saving rates one might be interested in knowing, whether the time-trend, slowly moving variables could also have some part in the explanation of the behaviour. Clearly, demographic variables DEP and RET – presented in Table 1 – as well as the fraction of self-employed workers from the total civilian employment are potential candidates. When these variables were introduced into the specification (2) as additional explanatory variables, they performed rather poorly (see Koskela and Virén (1991)).

9) We have also looked at the evidence for Finland in a more detailed way in terms of various estimation methods and a battery of diagnostic tests. The results did not changed qualitatively from those which has been reported above (see Koskela and Virén (1991) for details).

10) This lies in comformity with the weak (and a bit mixed) evidence on the relationship between household saving and house prices in U.S. (see Skinner (1991) for a recent survey).

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