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Bank of Finland Research Department
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**HOUSE PRICES, HOUSEHOLD SAVING AND
FINANCIAL MARKET LIBERALIZATION IN FINLAND¹**

Forthcoming in European Economic Review

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Contents

	page
Abstract	5
1 Introduction	7
2 Development of Housing Market and Household Saving in Finland	8
2.1 House Prices, Saving and Financial Market Liberalization ..	8
2.2 Real Interest Rates, Taxation and Spillovers from Rental Markets	11
3 A Framework for Analysis and Empirical Results	12
3.1 A Framework for Analysis	12
3.2 Empirical Results	14
References	18

Abstract

This paper describes some institutional aspects of housing markets and analyzes the price development of owner-occupied housing and its interaction with the household saving ratio in Finland during the last two decades.

In Finland the volatility of house prices in relation to income can to a large extent be traced to the major changes in financial market conditions. Two other factors have also contributed to the house price volatility, namely the favourable tax treatment of housing (and other) loans and the "thin" rental markets. The former has increased the rate of return on housing, while the "thin" rental markets have resulted from rent regulation, which has decreased the supply of rental housing. The evidence suggests that in addition to the financial market conditions — measured by the households' indebtedness rate — both the after-tax rate of return on housing and the "thinness" of rental markets have all had a positive effect on house prices. Finally, demographic factors seem to have some, though relatively minor, role in house price development, while the real income variable cannot be estimated precisely. As for the linkages between housing markets and saving behaviour, our analysis lies in conformity with the view that the rate of change of real house prices has affected negatively and the after-tax nominal interest rate positively the household saving ratio. We are tempted to interpret these findings as suggesting that financial market conditions, and particularly the financial market liberalization after the mid-1980 also explains the decline in the household saving ratio during the housing market booms.

1 Introduction

This paper describes some institutional aspects of housing markets and analyzes the price development of owner-occupied housing and its interaction with the household saving ratio in Finland during the last two decades.

In Finland the volatility of house prices in relation to income can to a large extent be traced to the major changes in financial market conditions. These changes gave rise to an increase in housing demand and house prices. Two other factors have also contributed to the house price volatility, namely the favourable tax treatment of housing (and other) loans and the "thin" rental markets. The former has increased the rate of return on housing, while the "thin" rental markets have resulted from rent regulation, which has decreased the supply of rental housing. This has lessened the importance of the rental markets as a shock-absorber. The evidence suggests that in addition to the financial market conditions — measured by the households' indebtedness rate — both the after-tax rate of return on housing and the "thinness" of rental markets have all had a positive effect on house prices. Finally, demographic factors seem to have some, though relatively minor, role in house price development, while the real income variable cannot be estimated precisely.

As for the linkages between housing markets and saving behaviour, our analysis lies in conformity with the view that the rate of change of real house prices has affected negatively and the after-tax nominal interest rate positively the household saving ratio. We are tempted to interpret these findings as suggesting that financial market conditions, and particularly the financial market liberalization after the mid-1980 also explains the decline in the household saving ratio during the housing market rooms.

The paper proceeds as follows. In section 2 we review briefly the housing market institutions¹ and describe both house price and saving developments and their potential explanatory factors. Section 3 presents econometric evidence on house price determinants and on household saving ratio in Finland during the last two decades.

¹ For a more detailed description of housing market institutions in Finland, see Bengs — Loikkanen (1991).

2 Development of Housing Market and Household Saving in Finland

2.1 House Prices, Saving and Financial Market Liberalization

The Finnish financial markets have been narrow and dominated by a small number of banks. Private institutions specialized e.g. on housing finance have been lacking. The banking system have been highly regulated with tightly controlled and rigid lending rates. Most interest rates were administratively controlled up to the beginning of the 1980s and the level of interest rates was low relative to the rate of inflation. Low, administratively controlled, interest rates jointly with foreign capital controls resulted in credit rationing. This system was relatively stable until the early 1980s, when tensions started to emerge. The Bank of Finland gradually deregulated the domestic banking system and in 1986, the ceilings on average lending rates were abolished.

This kind of market structure has given an important role for financial market conditions in terms of household borrowing, saving and housing demand and house prices. Up till the mid 1980s housing loans granted by banks had relatively short repayment periods. Even as late as the beginning of the 1980s the average loan maturity of dominant private loans was 8–10 years and the down payment ratio was 20–30 % of the purchase price of the house. The abolition of interest rate controls in late 1986 induced a huge growth of credit. The financial deregulation loosened the requirement for saving in advance of housing purchases, which led to a housing market boom.

There have been two booms in the housing markets in Finland during the period under consideration. The first started in 1972 and the second in 1987 and both were later on associated with a fall in household saving ratio as one can see from Figure 1.² Figure 3 in turn indicates the relatively strong association between housing demand and financial market conditions, measured by the households' indebtedness rate.

² We concentrate here on the behaviour of free market prices of privately finance dwellings. More precisely, the house price series in Figure 1 cover condominiums in multi-dwelling buildings which are organized as joint stock companies.

Figure 1. **Real House Prices and Household Saving**

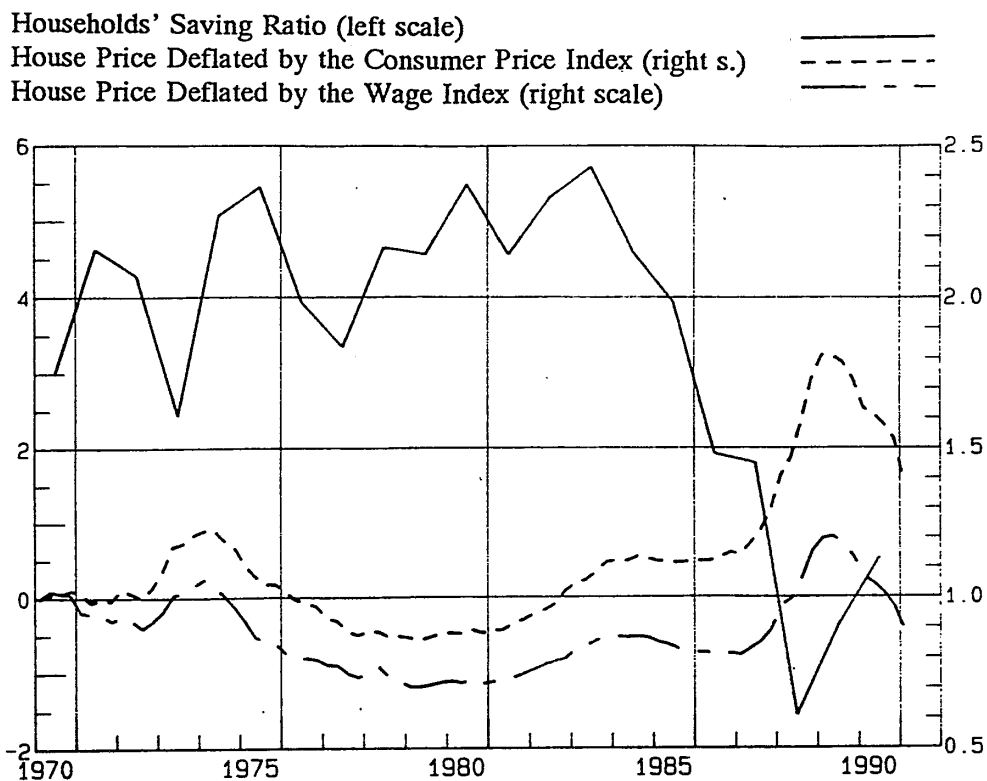


Figure 2. **Disequilibrium in the Housing Rental Market**

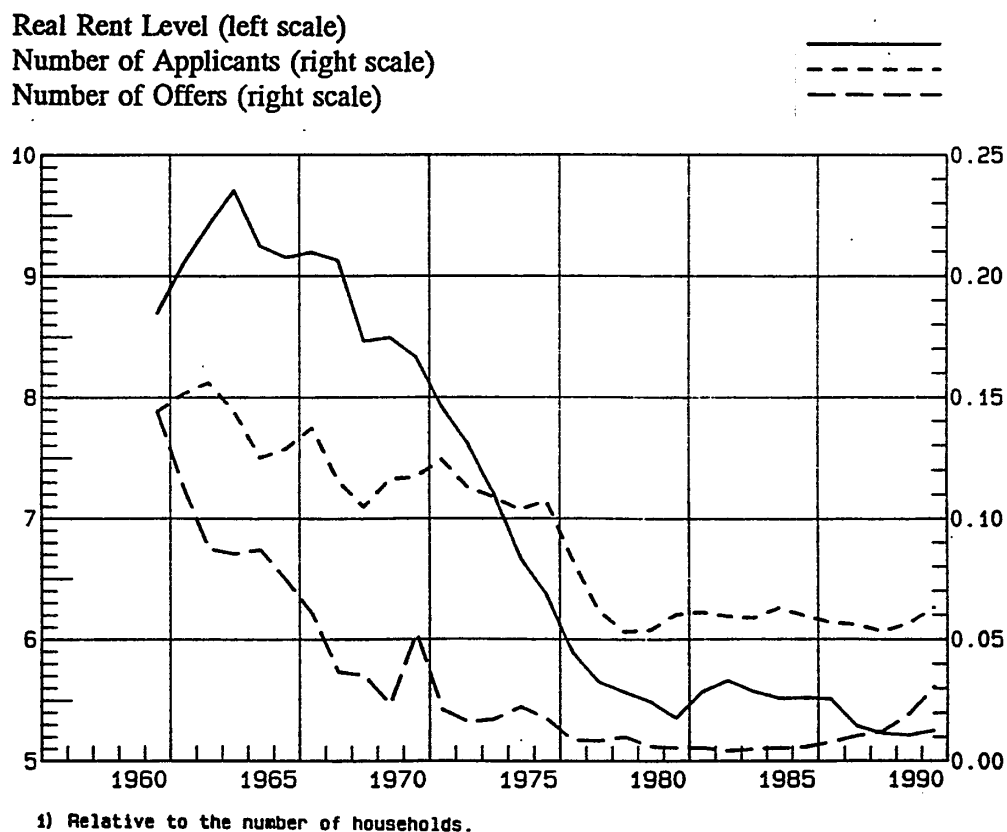


Figure 3. **House Prices and Households' Indebtedness**

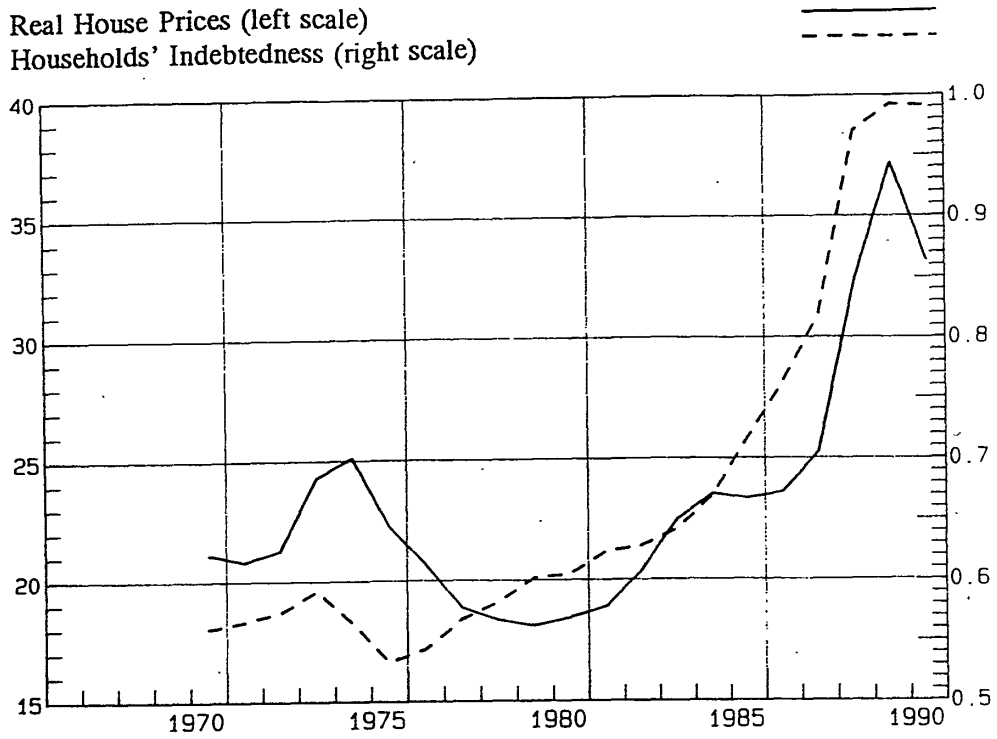
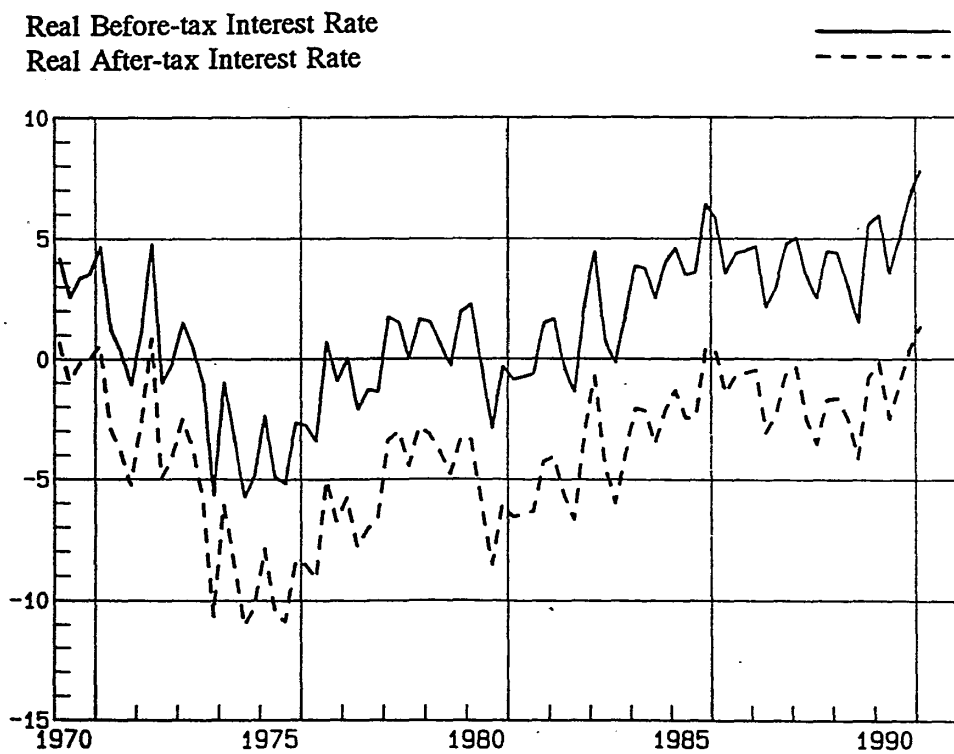


Figure 4. **Real Interest Rates**



2.2 Real Interest Rates, Taxation and Spillovers from Rental Markets

The demand for owner-occupied dwellings in Finland has been subsidized via direct housing subsidies, interest rate subsidies and taxation. Support provided by taxation has taken three forms: (i) capital gains arising from a rise in the value of an owner-occupied dwelling are generally not taxed, (ii) imputed rental income from a dwelling is not taxed (or taxed only lightly) and (iii) interest payments on housing loans are deductible in taxation up to a certain limit.³ As for capital gains, these were taxed up till 1971 according to the same rules as capital gains associated with other assets. After that capital gains on owner-occupied dwellings have practically been tax-exempt provided that dwelling has been owned and used as a permanent home at least a year before selling. Imputed rental income from a dwelling was taxed up till 1972 on a local basis so that on the average the imputed rental income was about 30 % of the local rent level. After that imputed rental income was tax-exempt up to a certain limit. The limit was 100 000 Finnish markka in 1973 and though the limit has been revised upwards over the years, its real value has decreased continuously. E.g. in 1983 only about 6 % of owner-occupiers had a small amount of imputed taxable rental income from their dwellings.

Finally, as for the interest payments on housing loans, they were wholly tax-deductible up till 1974, after which households could deduct their borrowing rate expenses up to a certain limit; there have been deduction limits both on housing loans and (a smaller limit) on other loans. The real value of interest rate deductions has been reduced during the 1980s both because the nominal limits have been either fixed or decreased slightly and because quite recently only part of the interest rate payments have been accepted as a deduction. These supports via taxation jointly with low administratively controlled lending rates resulted among others in the very low — in many cases even negative — after-tax real interest rate during the 1970s. But credit rationing did not allow for the full utilization of the tax advantages of borrowing and kept the households' indebtedness in control. After 1986, when the interest rate control was abolished, housing demand increased despite that fact that the after-tax real rate of interest went up (see Figure 4).

The working of rental market is also potentially important for the demand of owner-occupied houses and their price determination. In Finland rents in the private rental markets have been controlled most of the time (see Bengs — Loikkanen (1991)). Changes in disequilibrium in the rental market may affect tenure choice and eventually via spillover effects also price of owner-occupied housing. Cross-section evidence from

³ Tax deductions have been allowed not only on mortgage loans, but also on consumer loans. The tax deductions were unlimited up till 1974.

Finland supports the view that an increase in rental housing shortage, measured by the number of applicants per delivered rental unit in public housing offices, increases the probability of owning (c.f. Loikkanen (1991)). Here, we have constructed somewhat different measures with the same motivation.

To describe changes in disequilibrium in the rental housing market over time, we have constructed number of applicants and number of offers figures for the Helsinki area using newspaper information. The first conclusion to be drawn from Figure 2 is that the role of market type (newspaper) information has become smaller over time. Both series (scales to the number of households in the whole country as regional data is not available on annual level) decrease. It is somewhat surprising that the relative number of offers decreases so drastically also during the period when rents were free (1963–1967). There is no clear increase in the number of applicants after the beginning of rent control in 1968 either. Rather the decline continues in order to reach a constant level after mid 1970s. Both series, and especially that of offers begins to increase at the end of 1980s. Finally we note that the ratio of applicants per offer increased clearly during the fifteen years after 1960. After mid 1970s it decreased in order to remain rather constant until a further decrease at the end of the period. As for the mere rents, the transition from free rents to strict rent control during the years 1968–1973 and subsequent rent regulation resulted in a very clear decline in real rents (see Figure 2). Both indicators suggest that rental markets have become "thinner" over time. Not surprisingly, the share of rented dwellings has decreased from 44 in 1950 to 31 in 1985.

3 A Framework for Analysis and Empirical Results

3.1 A Framework for Analysis

The demand for the stock of owner-occupied housing can be regarded as function of such variables as real income, demography, relative rates of return in owner-occupied housing compared with other assets, the cost of borrowing and mortgage availability. Moreover, there may be spillovers from the rental markets which have to do with the fact that rent regulation has induced the selling off of existing private rented housing and reduced the supply of rental housing. In the short run, the supply of the second-hand houses can be taken as given and if one assumes that the price clears the market, then one can solve for the house price index as a function of the housing stock and the variables driving the demand for owner-occupied housing. In what follows we use the nominal house price

to disposable income ratio⁴ as the dependent variable, which characterizes the booms and busts in the owner-occupied housing market. We account for the dynamics in a simple way and specify the following equation for the nominal house prices to disposable income ratio PH/Y

$$\begin{aligned} \text{PH/Y} = & a_0 + a_1(\text{PH/Y})_{-1} + a_2y + a_3g + a_4v + a_5(\text{D/Y})_{-1} \\ & + a_6\text{dem} + a_7K_{-1} + u, \end{aligned} \quad (1)$$

where y = the (log) real income variable, g = the lagged rate of return on housing defined by the rate of change in of house prices minus the after-tax nominal interest rate,⁵ v the (log) real rent level which is here used as a proxy for the state of rental market. D/Y = the (log) households' indebtedness rate, dem = the demographic variable corresponding to the (log) ratio of population aged 20–29 to the total population, K = stock of owner-occupied housing and u is the error term.

During the 1970s it was observed that high rates of household savings tended to be associated with high inflation rates in OECD countries. An explanation for this phenomenon 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, when both are changing simultaneously. If so, unanticipated inflation is misinterpreted as a 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 can end up, after some steps (see Deaton (1977) for details, with the following basic specification $s = b_0 + b_1s_{-1} + b_2y^0 + b_3p$ where s is the households' saving ratio, y^0 the real income growth rate and p the inflation rate. 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 it positively.

During the housing market booms household debt and house prices rose and household saving fell sharply in relation to income. Therefore, it is natural to try to connect the change in saving behaviour with housing market booms (and busts) and in particular with financial market liberalization. One can 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 may not affect aggregate saving. Any relative price increase implies that some gain

⁴ This measure of affordability has been used in Muellbauer – Murphy (1991) and in Muellbauer (1991).

⁵ The average lending rate of the banks is used as the proxy for the nominal interest rate i and the after-tax nominal interest rate is $i(1-T)$, where T is the (average) marginal tax rate.

(those selling the good), while others loose (those buying the good) (see Skinner (1989)). Moreover, it can be argued that the household's saving ratio is an increasing function of the downpayment ratio. An aspect of financial market liberalization was that housing loans could be obtained at a lower downpayment ratios than earlier (see Hayashi-Ito — Slemrod (1988)).

Thus, in addition to the usual variables, the relative price of housing and the interest rate might affect household saving behaviour. 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

$$s = b_0 + b_1s_{-1} + b_2y^0 + b_3p + b_4ph + b_5i + b_6(1-T) + u, \quad (2)$$

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 $b_4 < 0$ if capital gains dominate capital losses. If the (average) marginal income tax rate will affect only via the tax deductibility of interest rate expenses, then the two last terms collapse to $b_5(1-T)i_t$ and $b_5 > 0$. Finally, u refers to the error term (see Koskela — Virén (1991) for a more detailed treatment).

3.2 Empirical Results

The data in the subsequent empirical experiments reported below are seasonally adjusted (the price, interest rate and tax rate data are not, however, adjusted) and with same exceptions they are derived from the Bank of Finland data bank. The data cover the period 1970Q1–1989Q4. A description as well a printout of the data are available upon request from the authors. The estimation results concerning the house price to income ratio and the household saving ratio are presented in Tables 1 and 2, respectively.

Estimation results from the house price (scaled by income) equation can be briefly summarized as follows: First, equations with lagged dependent variable perform quite well and pass the usual diagnostic tests without dummy variables. Second, the households' indebtedness rate has a positive effect on house prices. Thus the financial market liberalization has led to lower downpayment ratios and higher debt to income ratio. Third, the real rent level seems to affect house prices positively. This can be interpreted as reflecting the positive spillover effect of the "thin" rental

market — due to rent regulation — on house prices.⁶ Fourth, the lagged rate of return has a positive effect on house prices, which is consistent with the view that rising marginal tax rate has increased house prices by increasing rate of return on housing, *ceteris paribus*. Fifth, demographic structure of population seem to have a positive effect on house prices though the coefficient is not very significant. Finally, one should mention that the real income variable could not be estimated precisely. The same was true about the lagged stock of owner-occupied housing, whose coefficient was insignificant but had practically no effect on the coefficient estimates of other variables.⁷

As for the household saving ratio, the results are relatively good for the specification, according to which the saving ratio adjusts partially and responds positively both to inflation rate and real income growth. The rate of change of housing prices affects saving negatively and the after-tax nominal interest rate positively.⁸ These latter two effects can be interpreted as reflecting the interaction between housing markets and saving behavior; house price increases are windfall gains which tend to decrease household saving. On the other hand, rising marginal tax rate decreases saving by increasing the willingness to borrow.

⁶ We also experimented with the number of applicants relative to the number of households and with the number of offers relative to the number of households both as a difference and as a ratio form as proxies for rental market disequilibrium. Results were qualitatively similar to those reported in Table 1, but coefficient estimates were less precise.

⁷ Earlier empirical studies on house prices and/or housing demand in Finland include Vihriälä — Skurnik (1985), Salo (1990) and Suoniemi (1991). Their results are similar in terms of demographic factors, but they include neither the households' indebtedness rate as a proxy for financial market conditions nor the real rental rate as a proxy for rental market disequilibrium. See Salo (1990), however, which contains in the context of annual data some very weak indirect evidence on the role of rental market disequilibrium.

⁸ An obvious problem with the real housing prices is their potential endogeneity in terms of household 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. The rate of change in real housing prices leaded rather than lagged the household saving ratios. Earlier we argued that a rise in households' indebtedness rate due to financial market liberalization resulted in house price boom. This in turn decreased saving ratio (see Muellbauer — Murphy (1989) for similar evidence in the case of U.K.).

Table 1. Estimation Results for the House Price Equation

	(1)	(2)	(3)	(4)	(5)	(6)
Const.	-5.836 (19.99)	-7.252 (24.17)	-.971 (3.50)	.270 (0.34)	.031 (0.04)	.107 (0.13)
(PH/Y) ₋₁			.895 (24.18)	.840 (17.16)	.835 (18.92)	.837 (18.75)
y	-.270 (6.44)	-.217 (6.57)	.002 (0.15)	.004 (0.27)	.059 (0.61)	.028 (0.43)
g	.365 (3.38)	.164 (1.86)	.135 (4.67)	.134 (4.68)	.136 (4.72)	.133 (4.65)
v	.055 (1.21)	.234 (5.45)	.048 (2.97)	.073 (3.35)	.075 (3.40)	.076 (3.10)
(D/Y) ₋₁		.453 (7.12)	.097 (3.80)	.195 (3.09)	.166 (2.11)	.180 (2.65)
dem				.205 (1.68)	.186 (1.50)	.208 (1.65)
R2	.702	.826	.981	.982	.982	.982
SEE	.090	.070	.023	.023	.023	.023
DW	.212	.260	1.980	2.014	2.013	1.986
LM1521	.570	.565	..
J-B	.545	.807	.986	.982	.914	..
CHOW80	1.000	.987	.900	.905	.909	..
CHOW83	1.000	.885	.876	.935	.922	..

Numbers in parentheses under the estimates are t-statistics. Equations (1–5) are estimated by OLS and equation (6) by the Instrumental Variable Method. The dependent variable is (log) PH/Y, where PH denotes nominal house prices and Y households' disposable nominal income, y is the (log) real income variable which equals to the unemployment rate in equations (1–4), the real wage rate in equation (5) and the households' real disposable income in equation (6). In the context of equation (6), the real wage rate and the unemployment rate are used as additional instruments for y. g is lagged rate of return on housing, v is the log real rent level, D/Y is the (log) households' indebtedness rate and dem is the demographic variable corresponding to (log) ratio of population aged 20–29 to total population. LM1 denotes Godfrey's LM test statistic for first-order autocorrelation at the presence of lagged dependent variable, J-B is the Jarque-Bera test statistic for residual normality and CHOW80 (CHOW83) is the CHOW stability test statistic for the period 1980Q1 (1983Q3). The reported numbers for LM1, J-B and CHOW-test statistics are points of cumulative probability distribution. Hence, for instance, .950 is the threshold for the significance at the level of .05.

Table 2. Estimation Results for the Saving Rate Equation

	OLS1	OLS2	OLS3	OLS4	OLS5
Constant	-.014 (1.89)	.172 (0.93)	.012 (0.66)	-.027 (2.99)	.004 (1.14)
y^0	.456 (4.50)	.449 (4.51)	.476 (4.76)	.484 (4.95)	.382 (3.76)
ph	-.109 (2.32)	-.083 (1.70)	-.069 (1.40)	-.072 (1.53)	-.110 (2.13)
s_{-1}	.756 (11.52)	.727 (10.98)	.704 (10.49)	.710 (10.77)	.796 (11.83)
i	.221 (2.69)	.340 (3.31)	.339 (3.33)		
T		-.076 (1.86)	-.073 (1.80)		
p			.167 (1.57)		
$i(1-T)$.749 (3.44)	
r					-.023 (0.51)
R2	.771	.781	.789	.790	.749
SEE	.010	.010	.010	.010	.011
DW	2.348	2.379	2.397	2.412	2.299
LM1	.970	.984	.986	.988	.946
J-B	.978	.519	.222	.330	.630
CHOW80	.986	.954	.874	.844	.992
CHOW83	.960	.826	.634	.509	.954

Numbers in parentheses under the estimates are t-statistics. The dependent variable is the household saving ratios, s , y^0 = the real income growth rate, ph = the rate of change of the real housing price, i = the nominal interest rate, T = the (average) marginal income tax rate, p = the inflation rate and r = the real (after-tax) interest rate (which is derived by using ARIMA model forecasts for p). Otherwise, notation is the same as in Table 1.

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