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ON DETERMINANTS OF PRIVATE CONSUMPTION IN SWEDEN

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ABSTRACT

Quarterly and semiannual error-correction functions are estimated for total private consumption expenditures, cars, semi & other durables, and nondurable consumption. The aim is to develop structural relationships between consumption, or savings, and several determinants, treated as exogenous here, to aid in short-term forecasting and medium-term assessments. In line with common interpretations of recent behavior, net financial wealth and private housing assets play a prominent role, partly through short term capital gains, as do nominal after-tax interest rates, and changes in inflation and VAT. Surprising, however, is a strong additional influence of housing stock on consumption, which is interpreted as a positive effect of housing shortage on the net investment component in savings. Forecasts and medium term projections are made for 1993-1998 using the quarterly functions with endogenised financial wealth.

October, 1993

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ON DETERMINANTS OF PRIVATE CONSUMPTION IN SWEDEN

I. INTRODUCTION

The determination of private consumption and savings behavior in Sweden is of continuing concern. As reckoned in the national accounts, aggregate private consumption expenditure amounts to just over half of Swedish GDP. It has generally been high relative to official disposable income. In the latter half of the 80s expenditures rose sharply, exceeding income, mainly due to an exceptional rise in durables expenditures (see Exhibits 1 and 2). The associated decline in the savings rate occurred in concert with credit deregulation and large capital gains, which increased wealth, yet despite a rise in real after-tax interest rates. Though regarded as temporary, the fall in savings raised fears of continued secular decline.

A dramatic reversal later occurred as the savings ratio rose from minus five percent in the boom of 1988 to plus eight percent in 1992, when the economy had moved into depression. The initial recovery in savings was particularly welcome as it commenced in a period of overheating. It was probably partly induced by tax reforms reducing interest deductibility and shifting taxation from labor to consumption. Fears of insufficient long term saving remain, however, because current high savings are partly due to the culmination of the cycle in durables purchases and fears associated with increasing unemployment and future reforms of social security. This study develops consumption functions intended to capture major influences on developments during this turbulent period with a view to interpreting the past and prospects for the future.

Exhibit 1: Consumption and Income 1970-92

Bill kr 1985P. Sums over four quarters

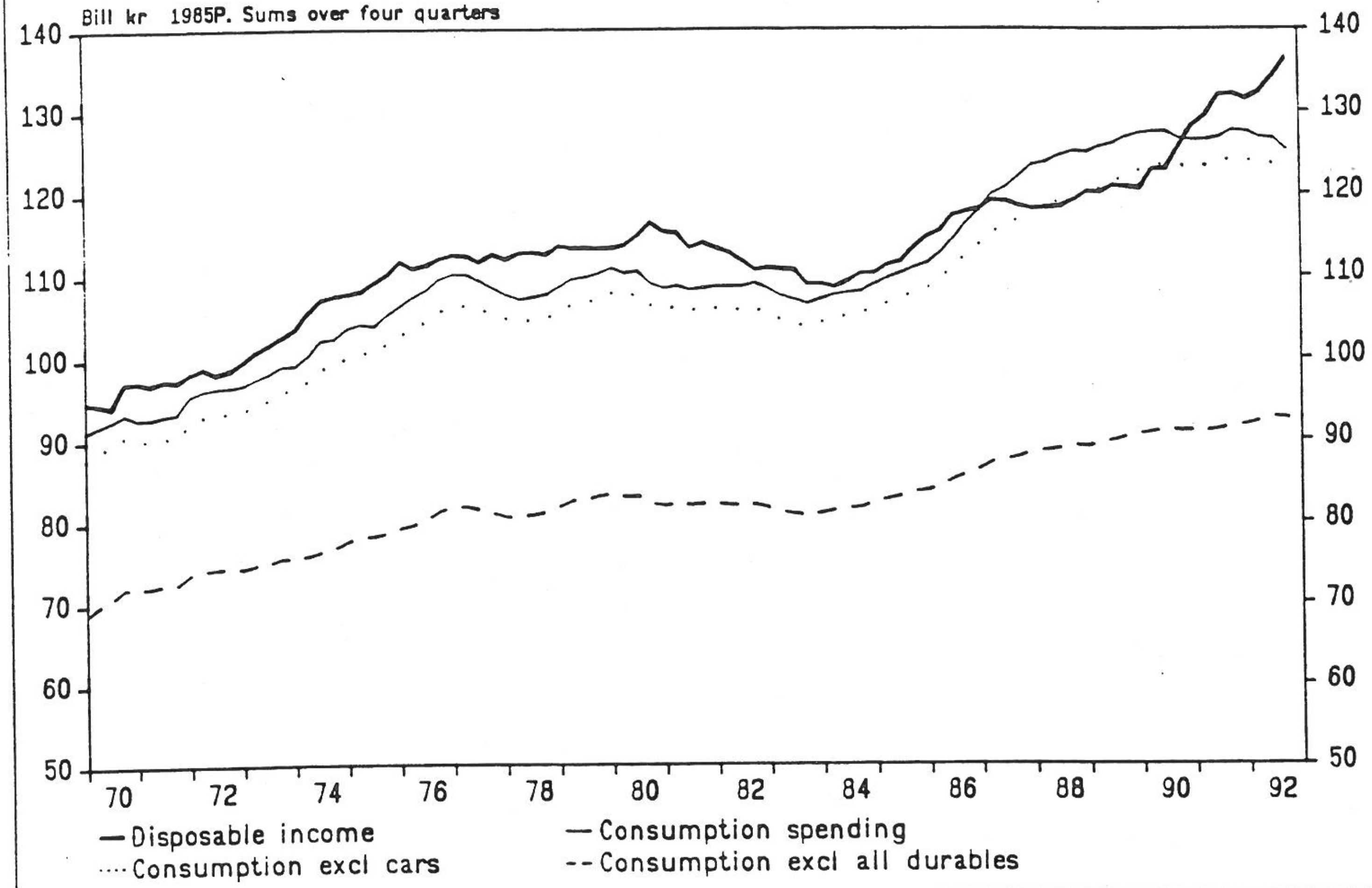
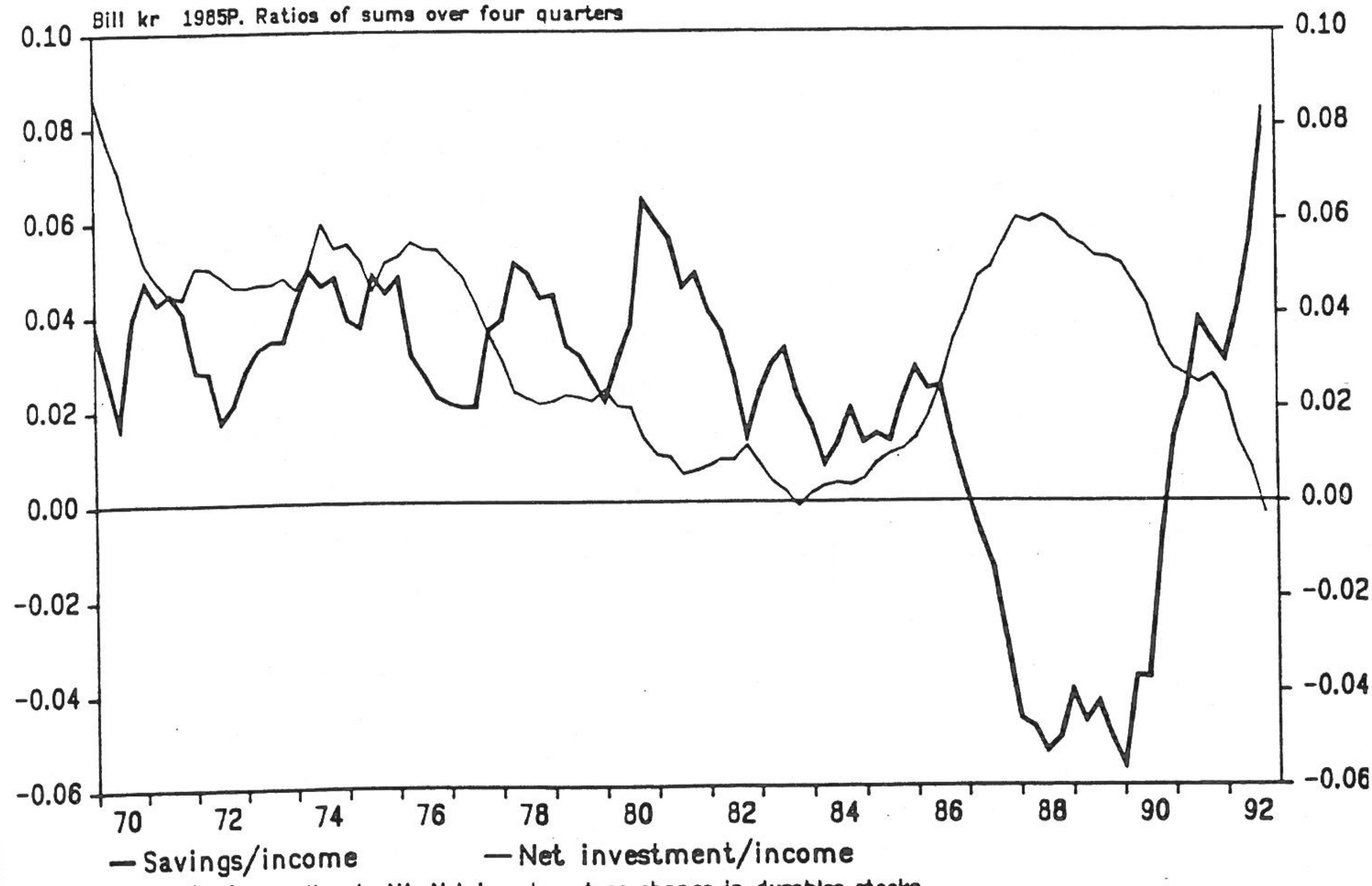


Exhibit 2: Savings Rate 1970-92

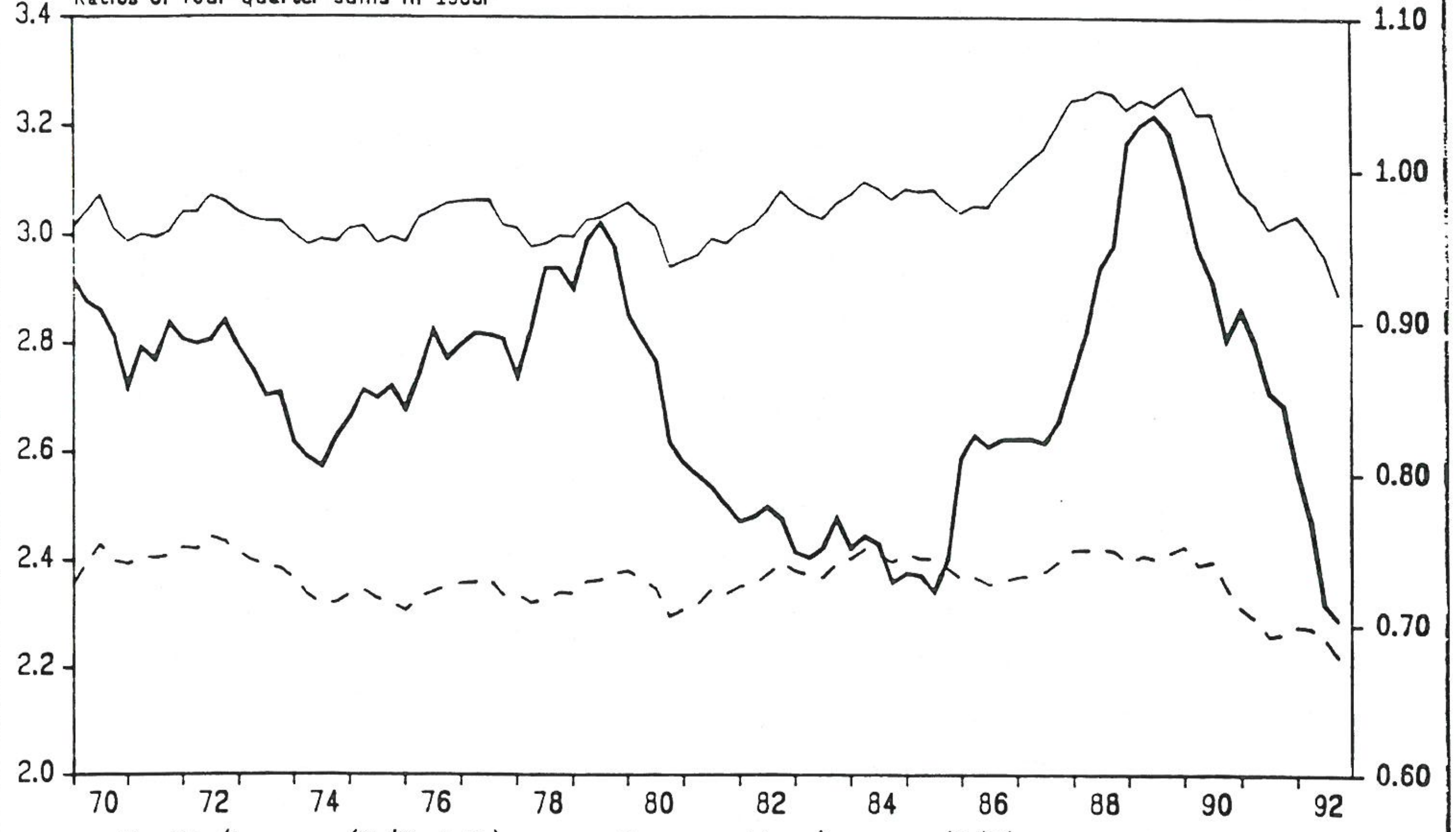
Bill kr 1985P. Ratios of sums over four quarters



Savings (net) according to NA. Net investment as change in durables stocks

Exhibit 3: Wealth and Consumption Ratios 1970-92

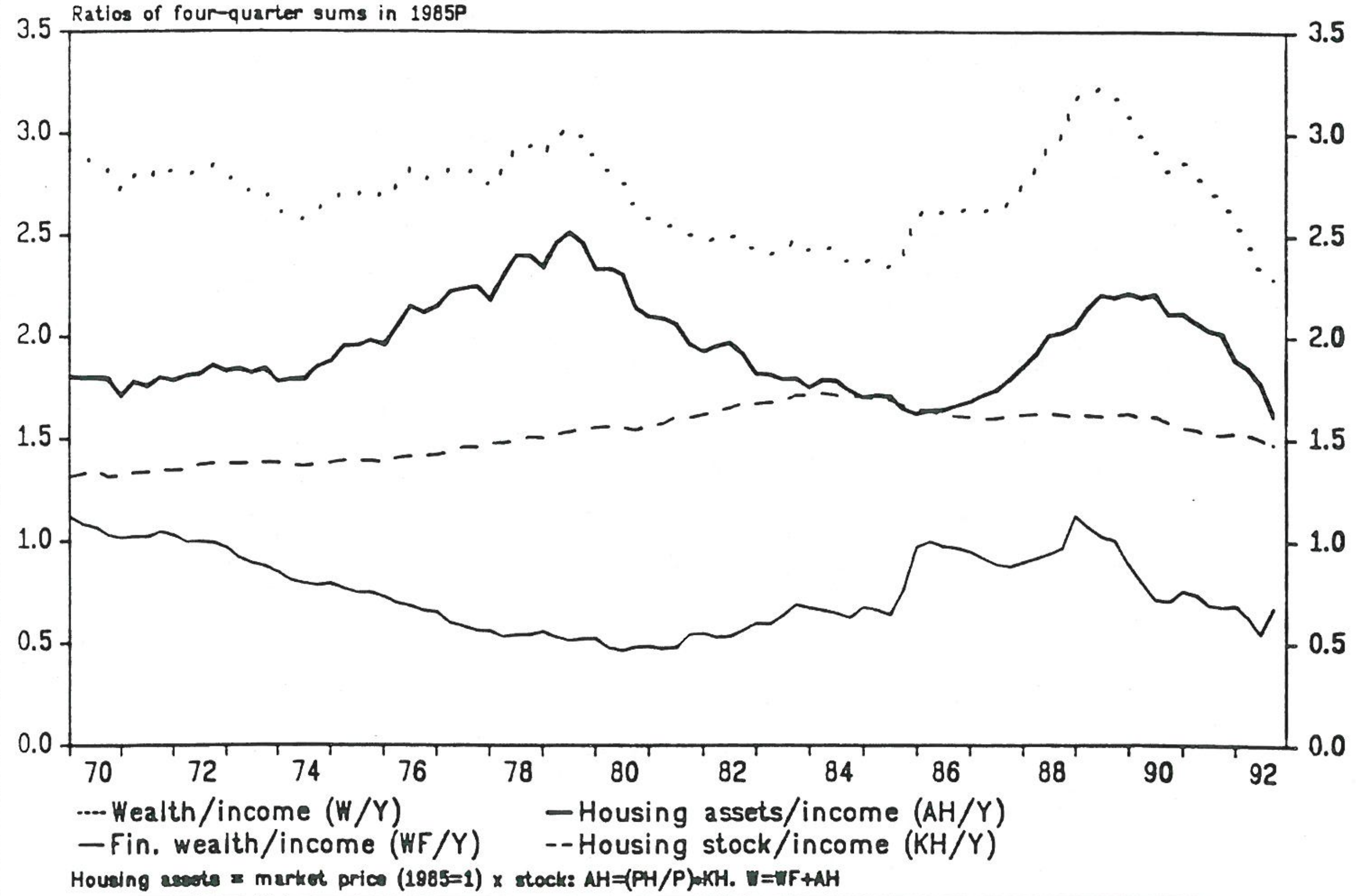
Ratios of four-quarter sums in 1985P



Wealth as the sum of net financial wealth and housing assets (W=WF+AH)

Exhibit 4: Wealth Components Relative to Income 1970-92

Ratios of four-quarter sums in 1985P



Housing assets = market price (1985=1) x stock: AH=(PH/P)*KH. W=WF+AH

Conventional expenditure aggregates and familiar functional relationships are used here as they correspond to concepts adopted by most parties concerned with the work of the NIER. Nevertheless, we treat expenditures on consumer durables as gross investment and associate durables stocks with "consumption" in the sense of a "flow". We present quarterly and semiannual consumption function estimates for aggregate expenditure, nondurable consumption, and two durables subaggregates, cars and semi & other durables, using data for 1970-92. Consumption data from 1991 on are preliminary.

The quarterly functions are intended primarily as an aid for interpreting and forecasting short-term developments. The functions shed light on the relevance of explanatory variables and the orders of magnitude of effects. The semiannual functions, besides providing a check on the former, pertain to the NIER's semiannual KOSMOS model, which is used mainly for medium term analysis. Durables receive special attention because of their highly cyclical character and their significance for imports. Being really investments, rather than consumption, durables purchases are relatively unstable and contribute more to changes in aggregate expenditure than corresponds to average shares in expenditure (cars 2.3%, other durables 23.7%).

We focus especially on the influences of wealth (Exhibit 3), including capital gains, endeavoring to account for the apparent instability of simple income-expenditure relationships. Wealth effects are theoretically well established in the literature on "life cycle" and "permanent income" theories. They are also popularly believed to underly the dramatic shifts in savings described above. Empirical studies by Berg [1990], Berg & Bergström [1991] and Kanis, Kottas and Kobba [1993] indicate that wealth or capital gains have indeed been important. Our model bears considerable resemblance to the models used in the first two of the mentioned studies above.

We are particularly interested in the roles of net financial wealth, which reflects stock market values and indebtedness, and assets in small homes, which account for more than half of total household assets. These series have been compiled at the NIER; one aim of this study is to examine their usefulness. Valuation changes in the components of total wealth are central to the question of wealth effects. Inflation and the after-tax interest rate, which the earlier studies did not find significant, are considered along with changes in indirect tax.

Strong evidence of the effects of wealth and capital gains is obtained, but interest rate effects appear to be unstable and mainly concern durables. Inflation reduces consumption, partly through the nominal interest rate. A surprising separate, positive contribution from the housing stock on consumption is encountered. Within the framework of our model, this effect is interpreted as an aspect of housing shortage - increasing satisfaction of the demand for private housing tending to reduce net investment in housing (in personal savings) and raise consumption. In a wider perspective, the pattern of development of the housing stock might - at least partly - be regarded as having proxied for omitted explanatory variables connected with developments in social security including pensions and job security. Underforecasts of the rise in the savings rate into the mid to late 90s suggests this is the case.

The paper is organised as follows. Section II presents the analytical framework, a constant-elasticity model for equilibrium consumption embedded in a dynamic model of error-correction adjustments. Section III interprets the empirical estimates. We deal with forecasts and projections with endogenized financial wealth for 1993-1998 in Section IV to examine the question of long term savings rates. Section V concludes. The main variables, indicated on page 19, are listed in the data appendix (including data estimates for the period before 1980).

II. THE MODEL

II.1 LONG TERM RELATIONSHIPS

Our point of departure is a simple equilibrium relationship disregarding stochastic terms:

$$(1) \quad C = A \cdot W^{a} Y^{a'} = A(W/Y)^{a} \cdot Y^{(1+e)} \quad ; \quad a+a'=1+e$$

$$(1') \quad 1-(S/Y) = C/Y = A(W/Y)^{a} \quad ; e=0$$

where C is consumer expenditure, Y is disposable income and W is net household wealth at the beginning of the period, all in 1985 prices. For the moment, unmentioned explanatory variables may be subsumed within the scale term, A.

When e=0, and bringing in savings (S), we have (1'). The equilibrium average propensity to save or consume would be constant for a constant wealth/income ratio and constant scale term. In steady state, income, consumption, savings and wealth grow, hypothetically, at the same rate. In contrast, the corresponding actual ratios are rather unstable over time (see Exhibit 3).

Nondurable consumption (CND) - total expenditure (C) minus spending on durables - develops more smoothly over time (Exhibits 1 and 3). It is explained in the same functional form. The elasticity condition e=0 need not hold, however, because the composition of total consumption may well change with the scale of income and wealth.

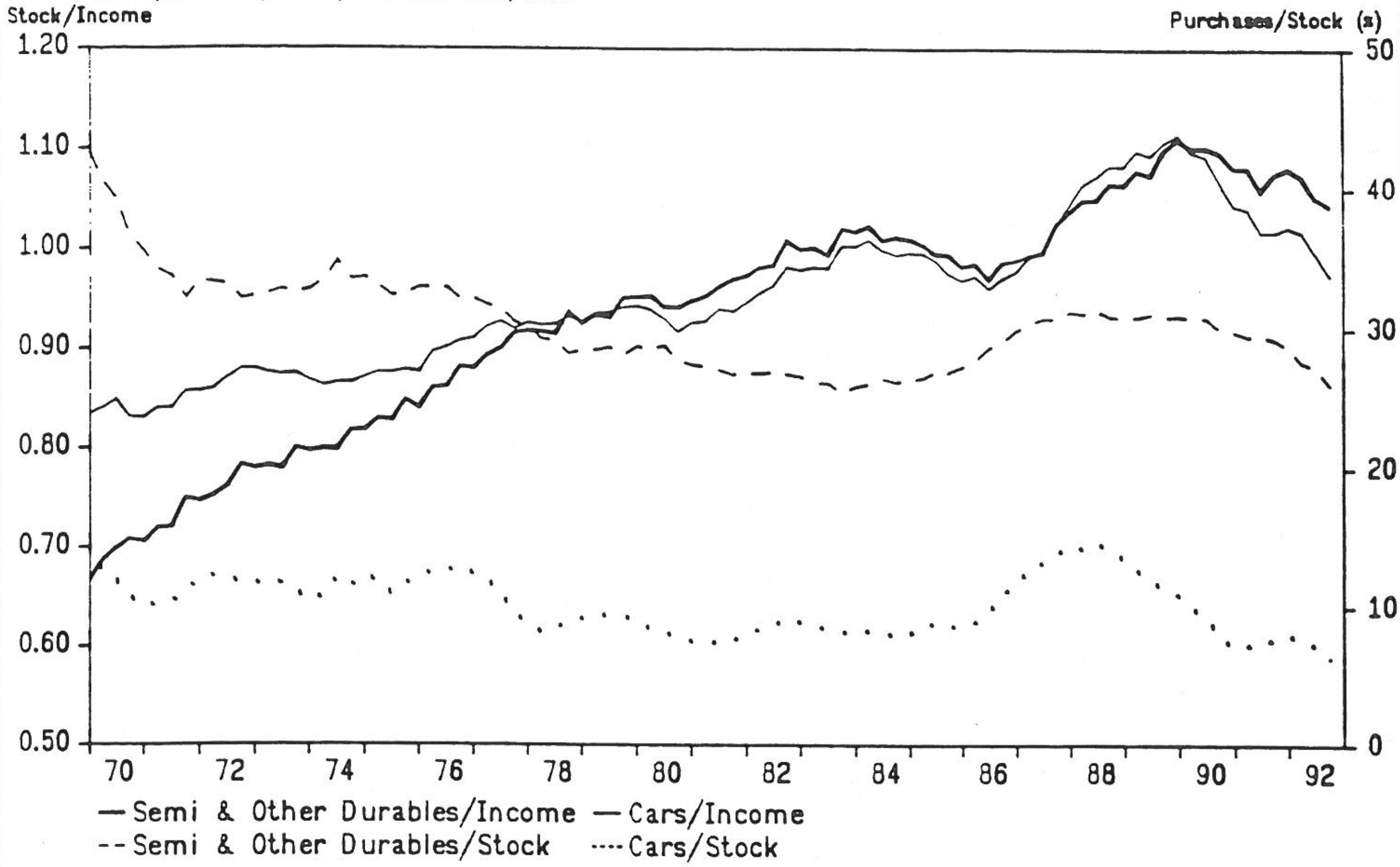
Long term relationships for durables are identical to (1),

$$(2) \quad K = A(W/Y)^{a} Y^{(1+e)}, \quad K/Y = A(W/Y)^{a} Y^{e}$$

but are expressed in (end-period) stocks of cars (KCAR) and semi & other durables (KCSOD) rather than purchases.

Exhibit 5: Accumulation of Durables 1970-92

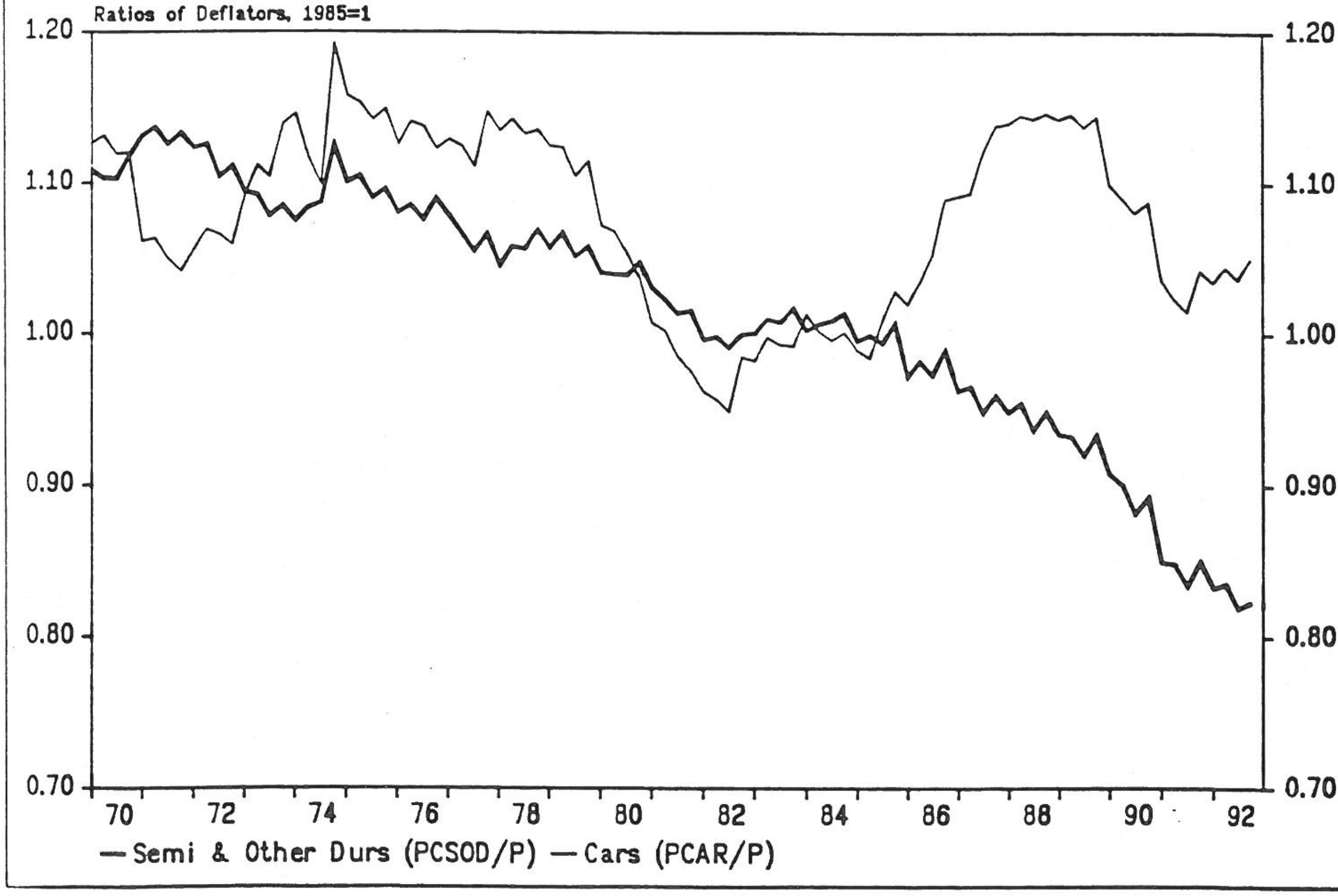
Stocks/Income (1985=1) and Purchases/Stock



Annualized quarterly data. KCSOD/Y = 0.81 and KCAR/Y = 0.32 in 1985, 1985P

Exhibit 6: Relative Prices of Durables 1970-92

Ratios of Deflators, 1985=1



Stocks are held mainly for the services they afford. Stocks rather than purchases are equated with "consumption" here, whereas purchases of cars (CAR) and semi & other durables (CSOD) are treated as gross investments. A "flow" measure of durables consumption would be the stock scaled by a rental cost of services composed of a yield and a depreciation rate. We do not investigate flow-consumption, because the yield measure would require a modification of official income and total consumption measures.

Our stocks are related to purchases by a standard perpetual inventory formula with a constant depreciation rate (d=.0190 for cars and d=.0648 for semi & other durables, per quarter). In steady state, purchases and stock would be proportional. Stock and income would be proportional for a constant wealth/income ratio if e=0. However, just as for nondurable consumption, e=0 need not hold for durables, owing to compositional shifts in total consumption as income grows. Stocks have tended to grow faster than income (Exhibit 5). Among the potential explanatory variables for durables are their relative prices (deflators relative to the total consumption deflator Exhibit 6).

Like Berg [1990] and Berg & Bergström [1991] we find that total net wealth is not statistically significant. As in those studies, we disaggregate net wealth (W) into net financial wealth WF (based on the financial accounts) and assets in private homes AH (Exhibit 4). Here housing assets are the product of the relative market price of private homes (PH/P) and a perpetual inventory housing stock (KH) computed from investment data on one-family primary and secondary homes, AH=(PH·KH)/P (1.

We also consider that the volume and price components of housing assets may be of different importance for consumption (Exhibit 7). The disaggregate wealth formulation corresponding to (1′) has the two equivalent forms below, where ah=aph, ak=aph-akh,

$$(3) \qquad C/Y = A(WF/Y)^{af}(PH/P)^{aph}(KH/Y)^{akh}(Y)^{e}$$

$$(3') \qquad C/Y = A(WF/Y)^{af}(AH/Y)^{ah}(KH/Y)^{ak}(Y)^{e}$$

The alternative forms distinguish the role of housing price and stock and of housing assets and stock, respectively. If the elasticities of stock and price diverge in (3), then there is an additional housing stock effect on consumption beyond the housing asset effect in (3'), the version used in estimation. Nondurable consumption or durables stocks can appear in place of total consumption as dependent variable here as in (1).

Whereas the accounting definition of wealth as a sum of financial and housing components (W=WF+AH) in effect presupposes an infinite elasticity of substitution between the components, the above specification, a weighted geometric mean, reduces the elasticity to unity. Wealth is a simple geometric mean if af=ah. The imperfect substitutability suggested by the insignificance of total net wealth in formulation (1) seems intuitively reasonable considering portfolio mixing at micro level (see also W.A. Barnett et al. [1992]).

The disaggregated relationship addresses several possibilities.

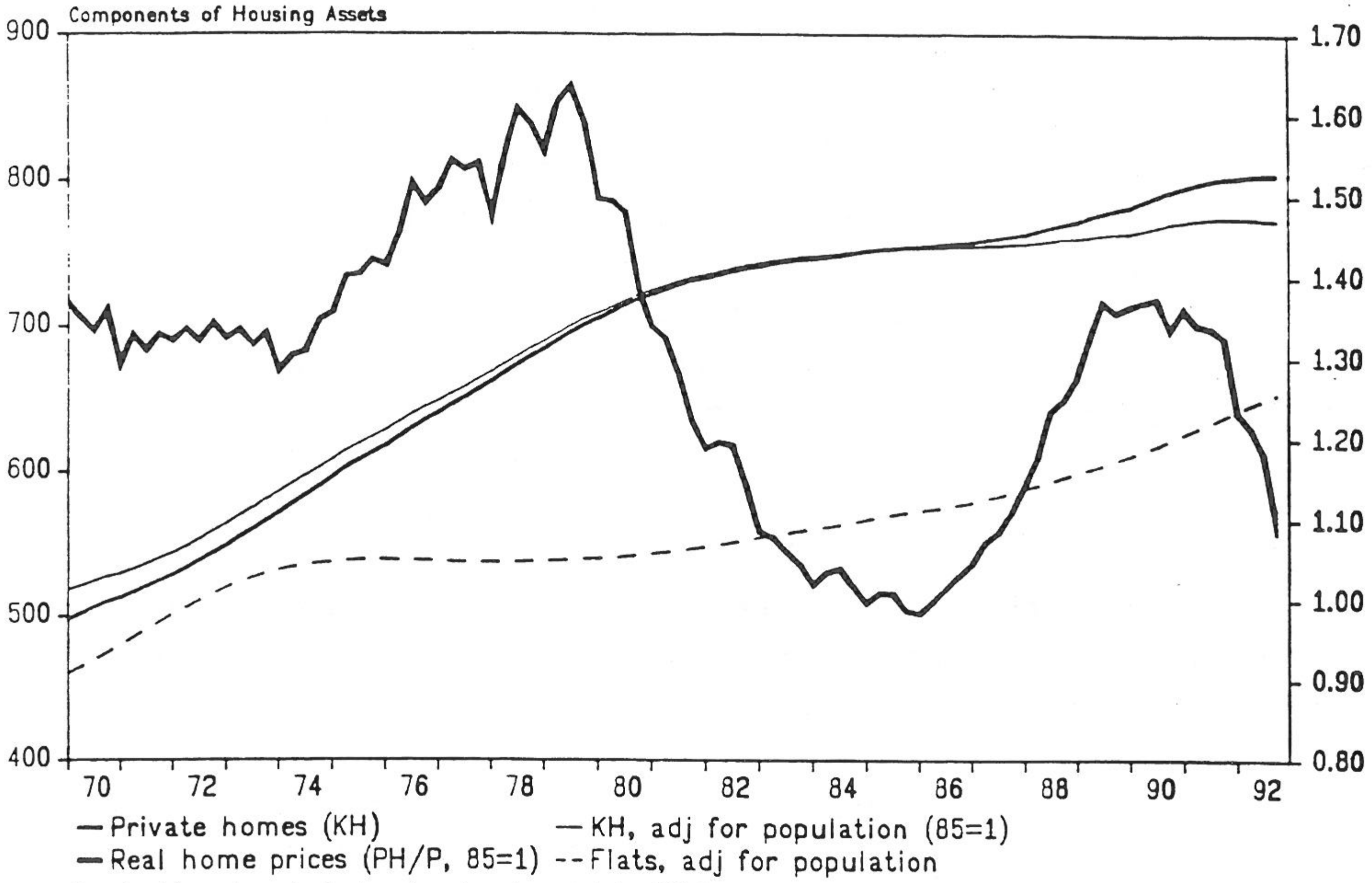
A. The <u>income term</u> (Y) above allows for the possibility that the average propensity to consume in the aggregate or for components depends on income (nonzero e)[(2]. This would be an unacceptable equilibrium characteristic of aggregate consumption, since the consumption ratio would then ultimately permanently breach the bounds of zero or unity. However, it is not unreasonable for its components.

B. <u>The housing stock/income ratio</u> KH/Y in (3) or (3') allows for the housing supply relative to income to influence the consumption (savings) ratio. Homes are not only a repository of wealth or collateral for loans, but the most durable of consumer goods, valued also for their use. Owing to extensive regulation, homes are treated as exogenous here rather than as just another durable (see Exhibit 7). Insofar as housing demand depends on income, KH/Y is a rough indicator of the relative satisfaction of housing demand.(3

Naturally sluggish adjustment of housing stock to demand makes for lingering malalignments between actual stock and the stock consumers desire to attain in time. In addition, housing subsidies and controls have historically maintained stock demand high relative to supply and often restrained housing investment, perpetuating a situation of more or less rationed stock. It is reasonable that in situations of shortage, more typical of the earlier years in our sample, households prioritized housing accumulation over present general consumption. This would be associated with higher investment in homes and thereby in the so-called "real" (net investment) component in the savings rate S/Y.

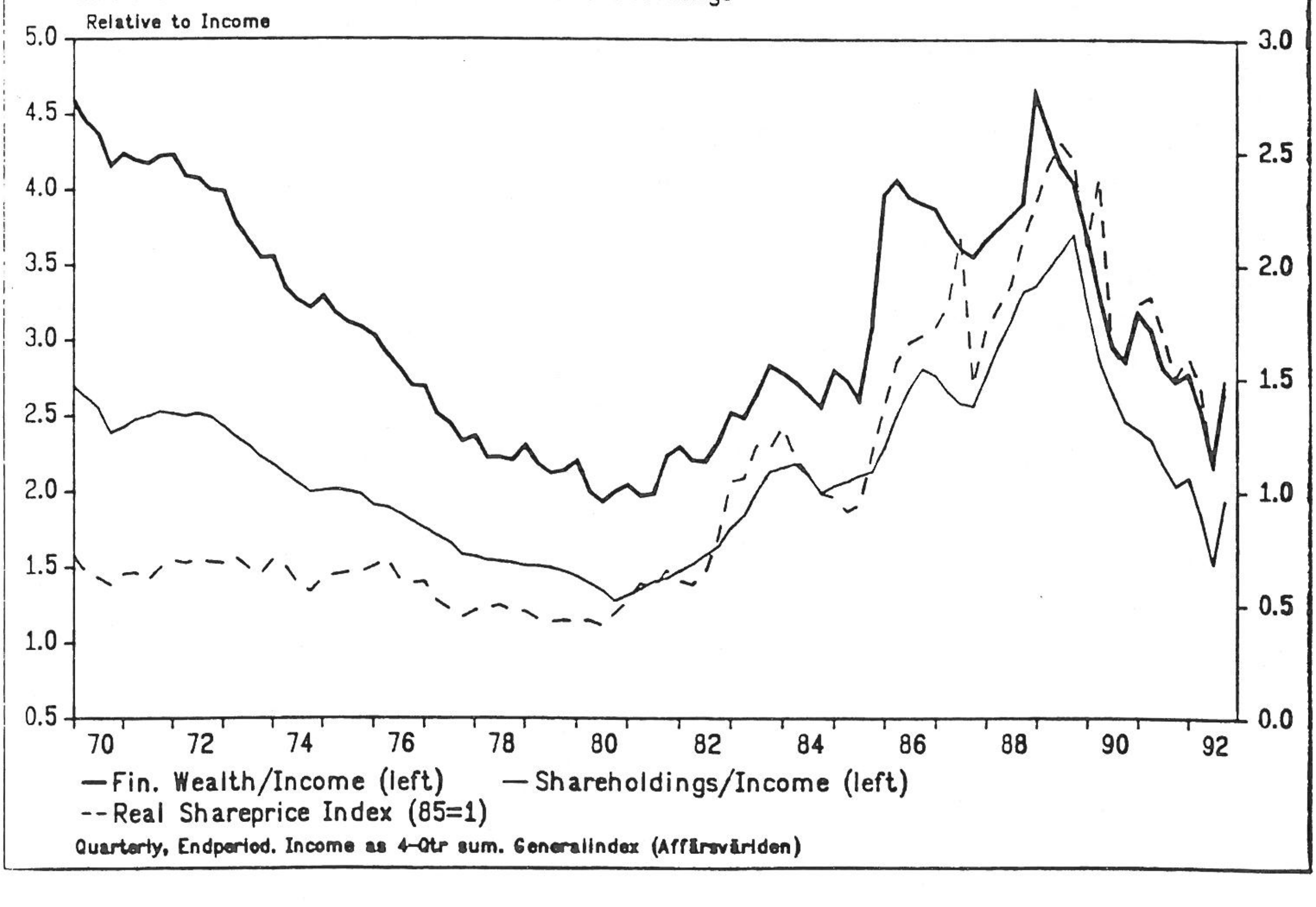
Unless this is offset by lower financial savings, it implies a lower consumption ratio. Home-buying in time gives rise to higher financial savings associated with loan repayments, unless prolonged indebtedness is possible and advantageous. Before 1986, particularly before reduced interest deductibility in the early 80s, prolonged indebtedness was more advantageous, but credit controls and amortisation rules limited it. Further reduction in interest deductibility (and higher real interest rates) with the tax reform of the late 80s rendered indebtedness more costly.

Exhibit 7: Real Price & Stock of Private Homes



Perpetual inventory stocks based on investment data. Bill kr

Exhibit 8: Net Financial Wealth & Shareholdings



Quarterly, Endperiod. Income as 4-Qtr sum. Generalindex (Affärsvärlden)

From this standpoint, the stock-component of the "wealth effect" of assets in private homes may be interpreted as partly an aspect of declining housing shortage. As the shortage subsides over the longer term, and housing stock rises relative to income, gradual expansion of financial savings relative to net investment in homes provides a potential for savings in financial form (net lending) or increased consumption. The choice is of course influenced by other factors such as demography, taxation and subsidization and perhaps wealth effects.

C. Real home prices PH/P of housing assets (Exhibit 7) are an important source of capital gains and losses. Housing assets amount to at least half of total household assets (as estimated). Swings in relative prices have at times been considerable and persistent.

Since housing supply (stock) is relatively sluggish, in the short term, shifts in stock demand relative to supply can result in dramatic changes in real estate values as a sort of temporary market clearing reaction (Hendry [1984]). These real price changes account for the short term variation in real housing assets and - as capital gains and losses - are widely held to have contributed to shifts in the consumption/income ratio in the late 80s and early 90s.

If effective, capital gains in housing may offset the possible tendency of more acute housing shortage (lower KH/Y) in prosperity to raise the (real) saving rate. The demands for present consumption and for investment in durables, including homes, then increase at the same time.

In a Tobin's Q-theory of housing investment, in the short term, a shortage would be associated with a high ratio (Q>1) of market price to the production price of new dwellings, whereas longer term stock adjustments would drive this relative price to unity. With Q=1 in the long term, nominal housing assets deflated by production price would effectively be the stock.

Insofar as consumer price and production price of housing move together, the real price component of housing assets (PH/P) is approximately proportional to the Q-ratio. Thus in the short term, with stock approximately fixed, housing asset changes are dominated by cyclical variation in real price, which may affect consumption over the short term through capital gains and losses, whereas the enduring, long term development in assets would be dominated by the development of the stock.

The more transitory nature of relative price departures from long term constancy suggests that volume and price components of housing assets may be of different importance for consumption decisions. Since price effects are more transitory, the stock elasticity would probably be the greater in (3): akh > aph. Hence in the equivalent (3'), where the stock elasticity is the difference between the stock and price elasticities of (3), a positive stock elasticity (ak=akh-aph)[4] would be expected. This was not investigated by Berg [1990] nor in Berg & Bergström [1991].

D. <u>Financial wealth</u> WF/Y (Exhibit 8) Liquid or financial assets commonly appear in consumption functions, if only because this sort of data is easily available. The broadest measure, net financial wealth, appears here. Much of its short term variation results from stock market prices. Valuation changes in financial wealth - from fluctuating stock market values - have at times been substantial and are widely suspected of having affecting consumption.

Greater short term volatility and exceptional amplitude of fluctuations in financial wealth, as compared with housing assets, can easily result in different estimates of effects. Insofar as households evaluate (weight) components of wealth in terms of transience, a smaller elasticity for financial wealth might seem reasonable. Effects on expenditure could nonetheless be large owing to the size of valuation changes. In other respects, comparison is difficult. Capital gains on financial assets are relatively easily realised, since selling a home usually involves obtaining another one and changing living patterns. On the other hand, capital gains on homes can be realized indirectly through collateral for long term loans with lower interest rates[5].

E. <u>Interest and inflation</u> (r and p, Exhibit 9). Variables hitherto impressed into the scale coefficient of (1) - (3') are real after-tax interest and inflation:

$$A = A0 \cdot \exp\{ -a_r \cdot (r(1-m)-p) + -a_p \cdot p \}$$

where r is a nominal interest rate, m is a marginal tax rate and p is the annual log-change in the consumption deflator P. The interest rate influencing the long term choice between consumption and saving is represented by the long (5-10 year) government bond rate. The marginal tax rate is the statutory maximum applicable to interest deductions for income tax one year ahead in time. A short term rate on (3-month treasury bills) appears in model dynamics below[6].

The sign of the real interest coefficient is an empirical matter depending on countervailing income and substitution effects. Commonly, the substitution effect is found to dominate ($a_r < 0$), perhaps because the dependent variable is not theoretic flow-consumption, but expenditure. Total expenditure includes durables purchases, which, being investments, are likely to respond negatively to the real interest rate. Aside from a dynamic "timing" effect on purchases, a negative long term response is hypothesized for durables stocks (K), because real interest is an opportunity cost. Even when the net interest rate is negative, a higher rate implies higher opportunity cost (lower subsidy).

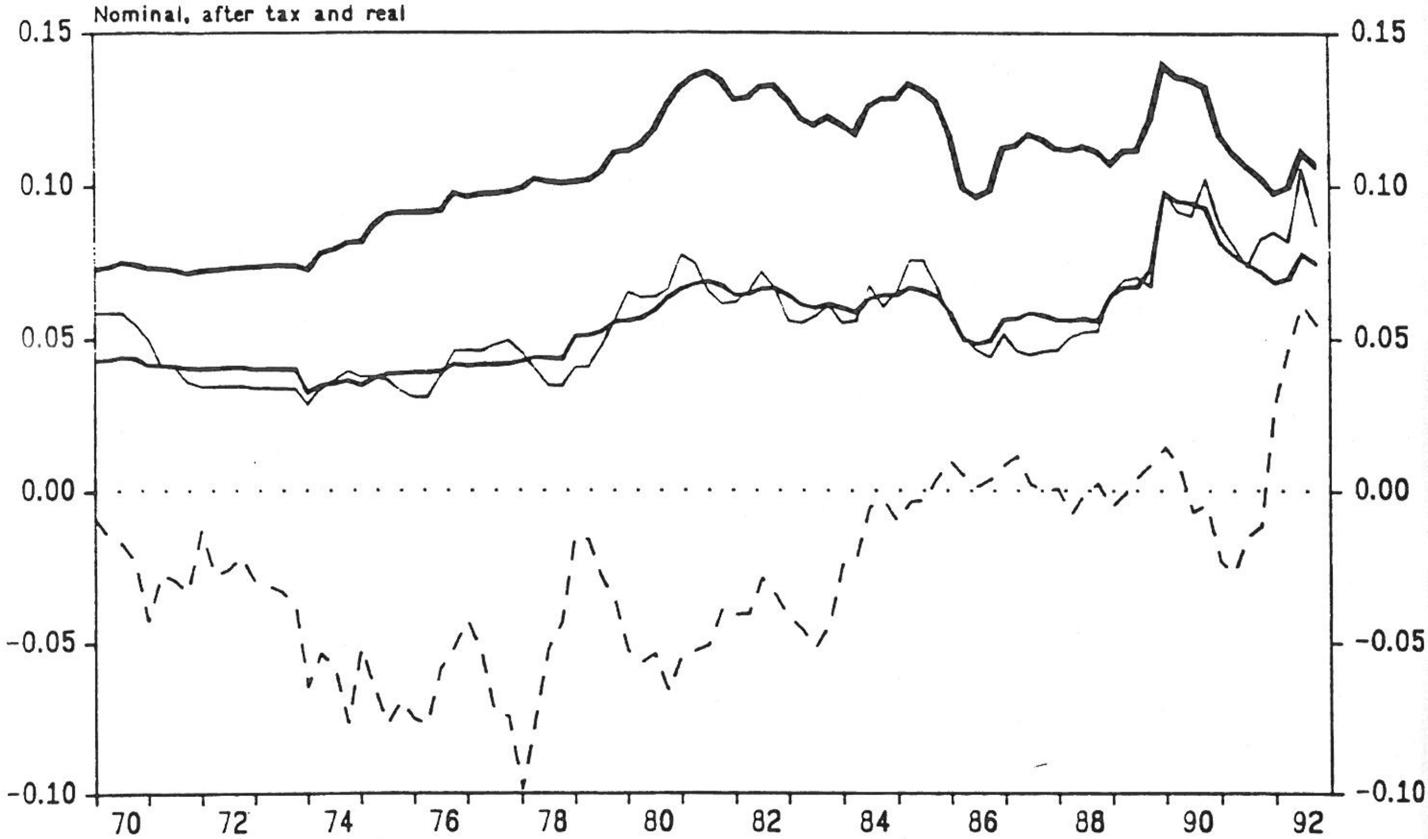
A separate negative inflation term is common in consumption functions, though its theoretical rationale is somewhat controversial (Bachelor & Dua [1992]). Its interpretation covers a wide range of perhaps overlapping factors such as capital losses on nominally fixed wealth or income, confusion of relative and absolute price changes or insecurity about future economic prospects. Some such features are already incorporated in the model. If the separate inflation term is superfluous, ie., $a_r = a_p$, inflation is left implicit in the nominal interest rate(7.

The change in the rate of inflation, however, enters behavioral dynamics. Use of survey data on expected inflation (as well as attitudes) may be a worthwhile future venture (Ågren & Jonsson [1991]).

Effects of credit deregulation in the mid-80s and interest and wealth effects are difficult to distinguish. Deregulation may have released a credit-constrained demand for consumption and all assets at initial asset values and interest rates, giving capital gains an extra boost. It is quite possible that estimated wealth effects are exaggerated owing to the pent-up nature of demand at the time of deregulation.

Exhibit 9: Interest Rates

Nominal, after tax and real

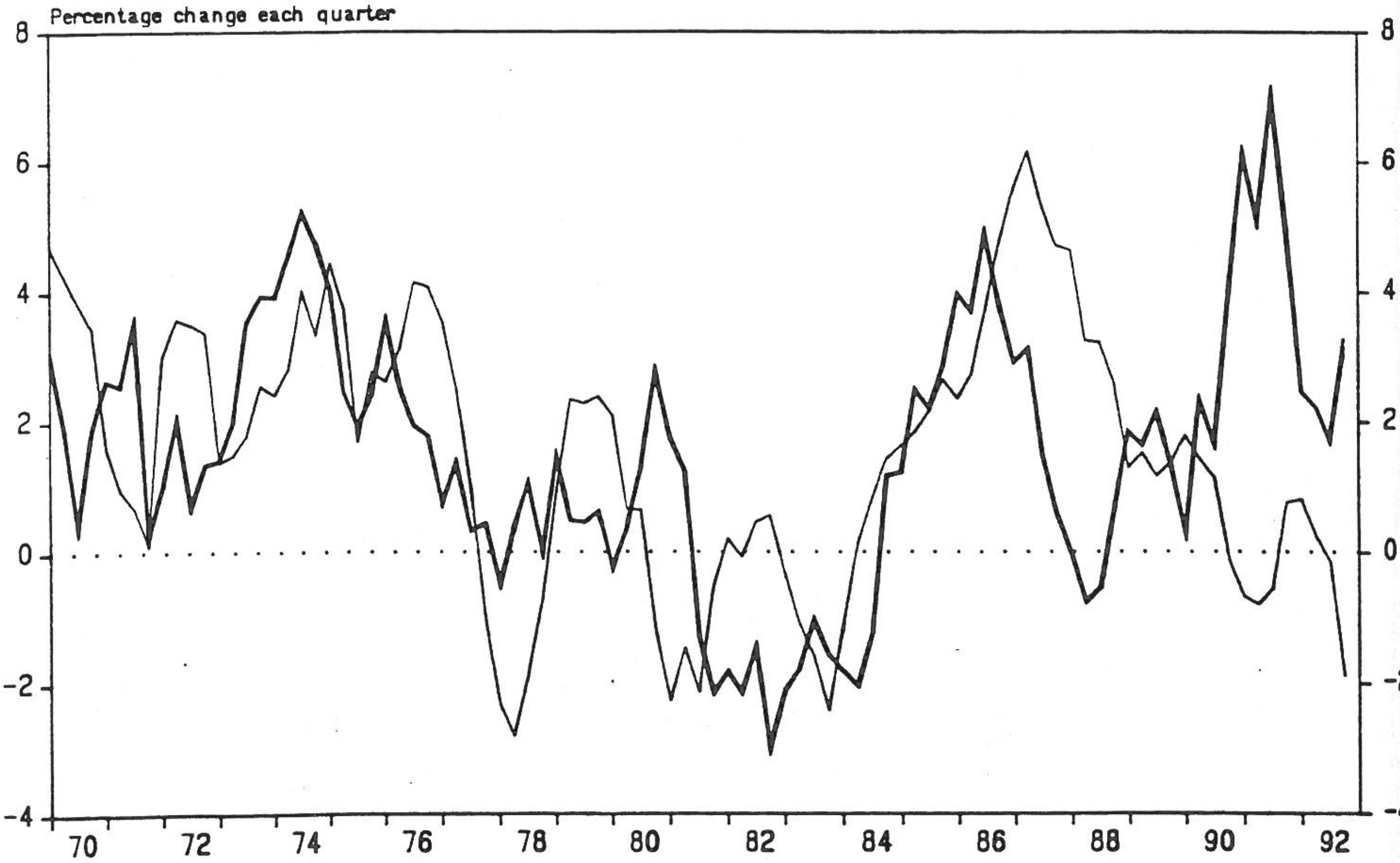


— TBonds, rl
— TBonds, after tax, rl(1-m)
— TBills, after tax, rs(1-m)
-- TBonds, net real, rl(1-m)-p

Treasury securities (5-10 yr, 3 mo). m=marginal tax. p=change in deflator

Exhibit 10: Rates of Growth in Income and Consumption

Percentage change each quarter



— Income
— Consumption expenditure

Changes in annualized values (smoothed: 4-Qtr sums)

An additional complication is that, soon after deregulation, housing investment became constrained by capacity limitations in the construction industry and policy controls. Some spillover of housing demand to other assets and consumption may have been induced. Morover, it is difficult to assess consumer expectations about tax reform, which could dampen borrowing in advance of the event, but which was not a political certainty at the time(8. We test for structural shifts, for the significance of a deregulation dummy, also combined with interest rates, and for a debt ratio effect to detect omissions.

Several other potentially relevant factors behind consumption behavior are beyond the scope of this study (see OECD [1983] for a broad overview). We do not investigate the inclusion in "wealth" of consumer durables, human wealth, expected pensions or other social security facilities of the welfare state. As a substitute for precautionary asset balances, social security may be regarded as implicit assets. The expansion of social security may be partly responsible for the long term fall of the savings ratio, as may recent and expected reforms for the recent dramatic recovery in savings. Nor do we investigate influences of unemployment on consumption. Insofar as these links are important, these omissions bias our results.

II.2 DYNAMICS

The estimation formula has an error-correction form (see eg. Alogoskoufis & Smith [1991]) resembling the following simplistic variant for annual data:

$$(a) \quad x-x_{-1} = b_0 - b \cdot x_{-1} + b_1 \cdot z_{-1} + b'(z-z_{-1}) + u$$

$$(4) \quad (b) \quad x-x_{-1} = -b[x - x^*]_{-1} + b'(z-z_{-1}) + u$$

$$(c) \quad x^* = a_0 + a \cdot z \; ; \quad a_0 = [b_0-(1-b')g]/b \; , \quad a=b_1/b.$$

where u is an ideal stochastic term. That is, essentially, change over time in a dependent variable x, eg., consumption, is interpreted as both a feedforward reaction on changes in income, etc, and a feedback impulse to previous disparity ("error") between the actual value of x and its equilibrium-path counterpart x^*. The "error" is corrected as in (4b). Previous high (low) values of x relative to x^* lower (raise) the current rate of change in x, bringing x into line with x* in the future at a rate which depends on the size of the error-correction coefficient b>0. The equilibrium relationship (4c) expressed in explanatory variables "z" is the counterpart to (3') above where z corresponds to income, wealth, etc. Substitution of lagged (4c) into (4b) yields the dynamic relationship used for estimation (4a), where current changes in z enter as well. The latter captures dynamic relationships (such as in Exhibit 10). Other dynamic explanatory variables may appear too.

Empirically, the order is reversed. Estimated (4a) is solved for the parameters of the hypothesized equilibrium relationship (4c), where the rates of change in x and z are set equal and constant ($g=x-x_{-1}=z-z_{-1}$). This corresponds to the equal, constant growth rates behind the constant ratios with respect to income in equilibrium (3').

Using special notation for logs and changes, the quarterly version of (3) is expressed in annual log-changes in (5) below. Anticipated signs are indicated. The operator D^j stands for a j-period difference, with D^1=D for simplicity, and L(x)= Log(x) for short. Thus, $D^jL(x)$ = Log(x/x-j) is a j-period difference in the logs. For quarterly data j=4, whereas j=2 for semiannual data in the dependent variable: $D^4L(x)$ and $D^2L(x)$ are annual rates of change. $D[D^jL(x)]$ then is the change in an annual rate of change, eg., $D(D^4L(P))$ is the change in the inflation rate $D^4L(P)$ in quarterly prices.

$$(5)\ D^4L(C) = b_0 + Seas - b\cdot L(C/Y)_{-4}$$

$$+ b_1\cdot L(WF/Y)_{-4} + b_2\cdot L(KH/Y)_{-4} + b_3\cdot L(PH/P)_{-4}$$

$$+ b_4\cdot L(Y)_{-4} - b_5\cdot (rl'_{avg4})_{-4} - b_6\cdot D^4L(P)$$

$$+ b_7\cdot DL(EDVAT) - b_8\cdot L(DVAT) - b_9\cdot D[D^4L(P)_{-4}] + u$$

$$+ b_{10}\cdot D^4L(PH/P) + b_{11}\cdot L(WF_{-1}/WF_{-4})$$

$$+ b_{12}\cdot D^4L(C)_{-1} + b_{13}\cdot D^4L(Y) + b_{13}\cdot (rs'-rl')_{avg4}$$

C: consumption expenditure	Y: disposable income
P: consumption deflator	PH: market price index, homes
WF: net financial wealth	AH: assets in homes (PH·KH/P)
VAT: indirect tax	KH: stock of homes
DVAT: VAT-change	EDVAT: expected DVAT[+]
rl: long interest rate	rs: short interest rate
rl'= rl(1-m), after tax	rs'= rs(1-m), after tax
m: marginal tax rate	SEAS: seasonal dummies

C, Y, WF, AH, KH are in millions, 1985 prices, P and PH are 1985=1, DVAT and EDVAT =1 for "no tax change" and the government bond, bill and tax rates are in decimals. Wealth and stocks are end-period measures here. Items with subscript "avgn" are n-period averages in the particular variable, eg., n=4-quarter or n=2-half-year moving averages, etc. Adaptation for stocks of cars and semi & other durables (KCAR, KCSOD) is described below.

If the explicit inflation rate is dropped (b_6=0), inflation becomes implicit in the long nominal after-tax interest rate, $rl' = rl(1-m)$. The disparity between the short and long rates ($rs'-rl'$), is a proxy for credit squeeze; a higher interest gap is interpreted as inducing postponement of purchases. Annual average interest rates function better than unaveraged rates as seems natural for a model in annual terms. In the equilibrium solution, the rates of change in consumption, income and wealth are constant and equal and merge with the interest rate into the scale term of the equilibrium function.

As discussed in the last section, the stock and relative price components of housing assets may not have identical effects on consumption in (3) or its dynamic counterpart (5). This means that housing stock may not drop out of (3') or its dynamic counterpart (5'). The latter, our estimating equation, is simply (5) with the substitution of terms:

$$(5') \quad b_2 \cdot L(KH/Y)_{-4} + b_3 \cdot L(PH/P)_{-4}$$

$$= b_2' \cdot L(KH/Y)_{-4} + b_3 \cdot L(AH/Y)_{-4} \ , \ b_2' = b_2 - b_3$$

The statistical significance of b_2' addresses explicitly the related questions of the relative importance of housing stock and price and of whether there may be an additional housing stock effect associated with shortage.

For durables, corresponding to (2), the error-correction term contains the stock/income ratio, KCAR/Y for cars and KCSOD/Y for semi & other durables, rather than expenditure/income ratios (CAR/Y, CSOD/Y). The dependent variables are ratios of purchase volumes to initial stock, $CAR/KCAR_{-1}$, $CSOD/KCSOD_{-1}$, which approximate the sum of stock growth and depreciation rates (d), eg., $CAR/KCAR_{-1} = DL(KCAR) + d$.

These ratios would be constant in steady state. Among the potential explanatory variables for durables are the logs of the respective relative deflators (PCAR/P, PCSOD/P) and their changes.

VAT changes are represented by DVAT and EDVAT rather than by dummies. Where V is the ratio of tax to price including tax(9, DVAT stands for P'/P= 1+v =(1-V)/(1-V'). This is the ratio of consumer price under the current tax rate (V') relative to the price which would obtain in the same period under the preceding tax rate (V) if tax changes are fully shifted forward. "No tax change" means L(DVAT) = v = 0.

EDVAT = DVAT(+1), expected price change due to a VAT-change in the coming period, is equated with actual next-period DVAT assuming that legislated VAT changes are known by the public in advance. Since L(DVAT)= v, DL(EDVAT) =v(+1)-v.

Usually, VAT changes do not occur in consecutive periods. Hence, as a rule, for a change implying v=.03 in period t+1, DL(EDVAT) equals .03 in period t and minus .03 in period t+1. A positive DL(EDVAT) coefficient would thus pick up an intertemporal hoarding effect over both periods, whereas the coefficient for DVAT picks up any residual response in the period of actual VAT-change. If most or all of the response is captured by the intertemporal term, the DVAT-term is insignificant.

Quarterly seasonal variation (SEAS) is represented by three seasonal dummies: DQi i=1,2,3, each equal to unity in quarter i, otherwise zero. The 4th quarter effect is in the intercept. The semiannual seasonal effects sum to zero over the year, making the intercept an average over the year: DS=(1,-1) in the 1st and 2nd half-years, respectively. To account for differences in seasonal pattern before and after 1980 (spliced periods originally with different base-years), each seasonal dummy reappears multiplied with a period-dummy, D70s=1 before 1980, eg., DQ1·D70s.

These ratios would be constant in steady state. Among the potential explanatory variables for durables are the logs of the respective relative deflators (PCAR/P, PCSOD/P) and their changes.

VAT changes are represented by DVAT and EDVAT rather than by dummies. Where V is the ratio of tax to price including tax[9], DVAT stands for $P'/P= 1+v =(1-V)/(1-V')$. This is the ratio of consumer price under the current tax rate (V') relative to the price which would obtain in the same period under the preceding tax rate (V) if tax changes are fully shifted forward. "No tax change" means L(DVAT) = v = 0.

EDVAT = DVAT(+1), expected price change due to a VAT-change in the coming period, is equated with actual next-period DVAT assuming that legislated VAT changes are known by the public in advance. Since L(DVAT)= v, DL(EDVAT) =v(+1)-v.

Usually, VAT changes do not occur in consecutive periods. Hence, as a rule, for a change implying v=.03 in period t+1, DL(EDVAT) equals .03 in period t and minus .03 in period t+1. A positive DL(EDVAT) coefficient would thus pick up an intertemporal hoarding effect over both periods, whereas the coefficient for DVAT picks up any residual response in the period of actual VAT-change. If most or all of the response is captured by the intertemporal term, the DVAT-term is insignificant.

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Strictly, to warrant the implementation of this model on our data, several statistical analyses must be made bearing on the order of integration of the empirical variables and on cointegrating relationships among them. A typical first step is to determine wehether the variables under investigation are integrated of the same order, since this is a necessary (though not sufficient) condition for a set of variables to be cointegrated. If the test is passed, cointegration is tested. These tests are reported in Appendix AII. Several requisite conditions seem not to hold (although the failures are not systematic either) contrary to what would be expected from economic theory. This may of course reflect the shortness of observation period or the nature of the data as well as defects of the model. Similar tests undertaken by Berg & Bergström [1991] using much the same data are not easily interpretable either. One reason for differing orders of integration is suggested from the hypothesized role of housing. If housing stock has been constrained by controls during part of the observation period, then its potential behavior may not be evident, but instead reflect the gradual relaxation of constraint. Consequently, if consumption has been affected by housing shortage, long term relationships and error correction may be distorted by changing constraint.

III. ESTIMATES

The dynamic estimates corresponding to (5′) are presented in sections III.1 and III.2 below. The equilibrium (steady state) elasticities corresponding to (3′) (Exhibit 11) are solved from the dynamic functions (see discussion of (4)) assuming: equal constant annual growth rates (g) in consumption, income, financial wealth and housing stock, equal inflation in prices of consumption expenditure and homes, constant and equal short and long interest rates, and unchanged VAT. We refer to the equilibrium elasticities in the course of the discussion.

EXHIBIT 11: Estimated Equilibrium Elasticities

Q: quarterly estimates, S: semiannual estimates

Dep Var = $A_0 \cdot \exp(-a_g \cdot g - a_r \cdot rl' - a_p \cdot p) \cdot WF^{af} \cdot KH^{ak} \cdot AH^{ah} \cdot Y^{ay}$

Dependent variable		a_g	a_r	a_p	a_f	a_k	a_h	a_y
C								
Total expenditure	Q:	.58	.51	..	.10	.21	.08	.61
	S:	.47	.55	..	.10	.31	.05	.54
CND								
Nondurable Consumption	Q:	.86	..	.21	.04	.21	.06	.41
	S:	.84	..	.24	.04	.14	.06	.38
KSOD								
Semi & Other Durables	Q:	.26	3.70	..	.15	.98	..	.59
	S:	.35	2.17	..	.12	.78	..	1.54
KCAR								
Cars	Q:	.56	.51	..	.15	.60	..	.73
	S:	.28	..	..	.10	.79	..	.41

Note. The elasticity for real home prices corresponding to equation (3) is identical to a_h, whereas the stock elasticity of (3) is the sum a_y+a_k here. For CND, a_g is more exactly $[1-b'g_y/g]/b$ where g_y, g are growth rates in income and consumption, respectively, b is the error-correction coefficient and b′ the coefficient of $D^4L(Y)$. It is computed with $g=g_y$, although as explained in the text $g<g_y$. Hence, a_g is be larger than indicated. Significance tests are not provided in our program.

III.1 TOTAL EXPENDITURE AND NONDURABLES

The estimates for total consumption expenditure and nondurable consumption are rather similar - see Exhibits 12 and 13 below. Generally more than 80 % of the variation in the annual rate of change is explained and standard errors are around 1%. Durbin's M and similar statistics indicate no serial correlation in errors for low lags, whereas Chi^2 tests show serial correlation from about a two-year lag. This may reflect imperfect dynamic specification or changing seasonal pattern. Chow-tests indicate no structural difference between the 70s and 80s, where different base-year series were spliced, after 1985, when the credit deregulation occurred, or from 1990, when the downturn started and major tax reforms were implemented.

Re-estimates on the shorter period 1970-90 were made to forecast 1991-92 (incl 1993q1 for the quarterly data). The forecasts as well as the predicted values from the within-sample estimates for 1980-92 are presented in Exhibit 14. (See also forecast statistics in Appendix A1). The quarterly functions seem to track behavior well even in the recent downturn, but, inexplicably, the semiannual functions overestimate. The similarity of forecasts and within-sample predictions reflects general coefficient stability over different estimation periods, also shorter than the above. Only the coefficients of the interest rate level are markedly unstable, although there are indications of instability for the change-in-inflation term and the VAT-term, which may be connected with the dramatic fall in inflation in 1992 and with the operation of the new tax system in a period of crisis.

Aside from the explanatory variables present, other items of suspected relevance are not significant: lagged durables stocks, debt/income or debt/wealth ratios, debt changes, similar measures for shareholdings,and a credit market deregulation dummy.

EXHIBIT 12 TOTAL CONSUMPTION EXPENDITURE

<u>Quarterly</u> 1970q4-92q4	<u>Semiannual</u> 1970s2-92s2
$D^4L(C) \; =$	$D^2L(C) \; =$
$+\ 0.198 \cdot D^4L(Y)$ (3.82)	$+\ 0.300 \cdot D^2L(Y)$ (3.98)
$+\ 0.139 \cdot D^4L(C)_{-1}$ (2.01)	$+\ 0.127 \cdot D^2L(Y)_{-1}$ (1.79)
$+\ 0.379 \cdot DL(EDVAT)$ (4.11)	$+\ 0.260 \cdot DL(EDVAT)$ (3.11)
$-\ 0.307 \cdot D(D^4L(P))$ (2.37)	$-\ 0.188 \cdot D(D^2L(P))$ (1.71)
$+\ 0.199 \cdot D^4L(PH/P)$ (5.52)	$+\ 0.136 \cdot D^2L(PH/P)$ (3.64)
$+\ 0.062 \cdot D^3L(WF_{-1})$ (4.10)	$+\ 0.051 \cdot DL(WF_{-1})$ (2.36)
$-\ 1.080 \cdot (rs'-rl')_{avg4}$ (3.76)	$-\ 0.826 \cdot (rs'-rl')_{avg2}$ (2.67)
$-\ 0.115 \cdot DL(C/Y)_{-1}$ (2.19)	+ ...
$-\ 0.251 \cdot DL(C/Y)_{-2}$ (3.56)	+ ...
$-\ 0.364 \cdot DL(C/Y)_{-3}$ (5.04)	+ ...
$-\ 1.091 \cdot L(C/Y)_{-4}$ (8.99)	$-\ 0.734 \cdot L(C/Y)_{-2}$ (6.17)
$+\ 0.106 \cdot L(WF/Y)_{-4}$ (7.99)	$+\ 0.075 \cdot L(WF/Y)_{-2}$ (4.49)
$+\ 0.220 \cdot L(KH/Y)_{-4}$ (6.39)	$+\ 0.231 \cdot L(KH/Y)_{-2}$ (4.94)
$+\ 0.081 \cdot L(AH/Y)_{-4}$ (3.92)	$+\ 0.036 \cdot L(AH/Y)_{-2}$ (1.40)
$-\ 0.556 \cdot (rl'_{avg4})_{-4}$ (3.59)	$-\ 0.401 \cdot (rl'_{avg2})_{-2}$ (2.03)
$-\ 0.661 \; + \; SEAS$ (6.79)	$-\ 0.318 \; + \; SEAS$ (3.85)
R^2 (adj) 0.821	R^2 (adj) 0.854
Standard Error 0.012	Standard Error 0.009
Durbin M -0.826	Durbin M 0.069

EXHIBIT 13 NONDURABLE CONSUMPTION

Quarterly 1970q4-92q4

$D^4L(CND) =$

$+ \underset{(4.11)}{0.139} \cdot D^4L(Y)$

$+ \underset{(2.45)}{0.167} \cdot DL(EDVAT)$

$- \underset{(6.02)}{0.294} \cdot D^4(D4L(P))$

$+ \underset{(9.57)}{0.187} \cdot D^4L(PH/P)$

$- \underset{(4.51)}{0.122} \cdot DL(CND/Y)_{-1}$

$- \underset{(6.42)}{0.252} \cdot DL(CND/Y)_{-2}$

$- \underset{(10.06)}{1.034} \cdot L(CND/Y)_{-4}$

$+ \underset{(4.11)}{0.037} \cdot L(WF/Y)_{-4}$

$+ \underset{(5.26)}{0.146} \cdot L(KH/Y)_{-4}$

$+ \underset{(4.46)}{0.066} \cdot L(AH/Y)_{-4}$

$- \underset{(10.67)}{0.359} \cdot L(Y)_{-4}$

$- \underset{(2.67)}{0.219} \cdot D^4L(P)_{-4}$

$- \underset{(10.94)}{3.446} + SEAS$

R^2 (adj)	0.772
Standard Error	0.009
Durbin M	-0.353

Semiannual 1970s2-92s2

$D^2L(CND) =$

$+ \underset{(3.05)}{0.163} \cdot D^2L(Y)$

$+ \underset{(1.92)}{0.106} \cdot DL(EDVAT)$

$- \underset{(5.10)}{0.276} \cdot D^2(D^2L(P))$

$+ \underset{(7.61)}{0.134} \cdot D^2L(PH/P)$

$- \underset{(3.06)}{0.169} \cdot DL(CND/Y)_{-1}$

$+ \ldots$

$- \underset{(8.70)}{1.087} \cdot L(CND/Y)_{-2}$

$+ \underset{(4.53)}{0.048} \cdot L(WF/Y)_{-2}$

$+ \underset{(6.72)}{0.233} \cdot L(KH/Y)_{-2}$

$+ \underset{(4.07)}{0.070} \cdot L(AH/Y)_{-2}$

$- \underset{(8.85)}{0.321} \cdot L(Y)_{-2}$

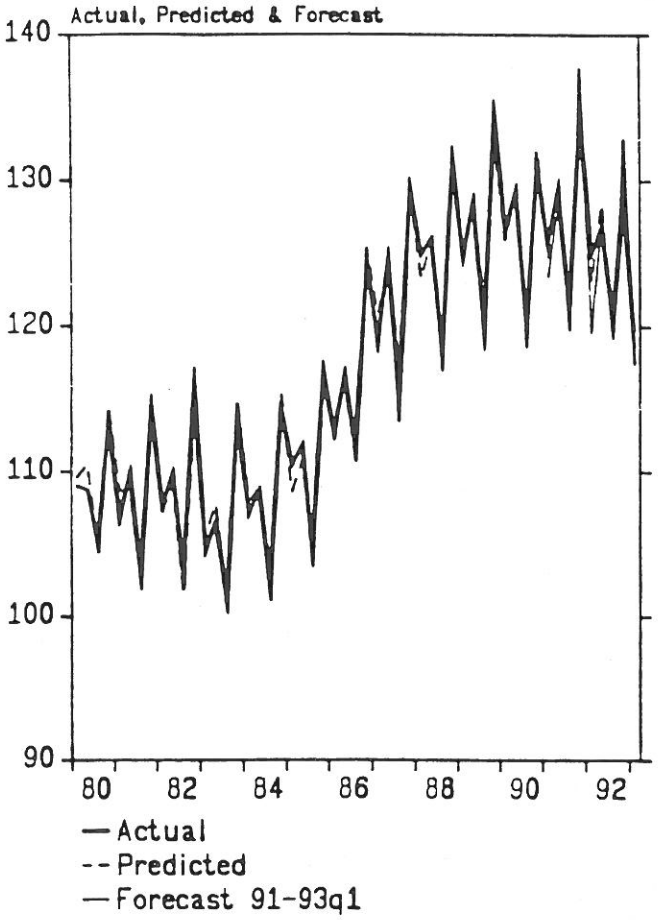
$- \underset{(3.05)}{0.265} \cdot D^2L(P)_{-2}$

$- \underset{(9.02)}{3.273} + SEAS$

R^2 (adj)	0.853
Standard Error	0.006
Durbin M	0.596

Exhibit 14: CONSUMPTION - Quarterly

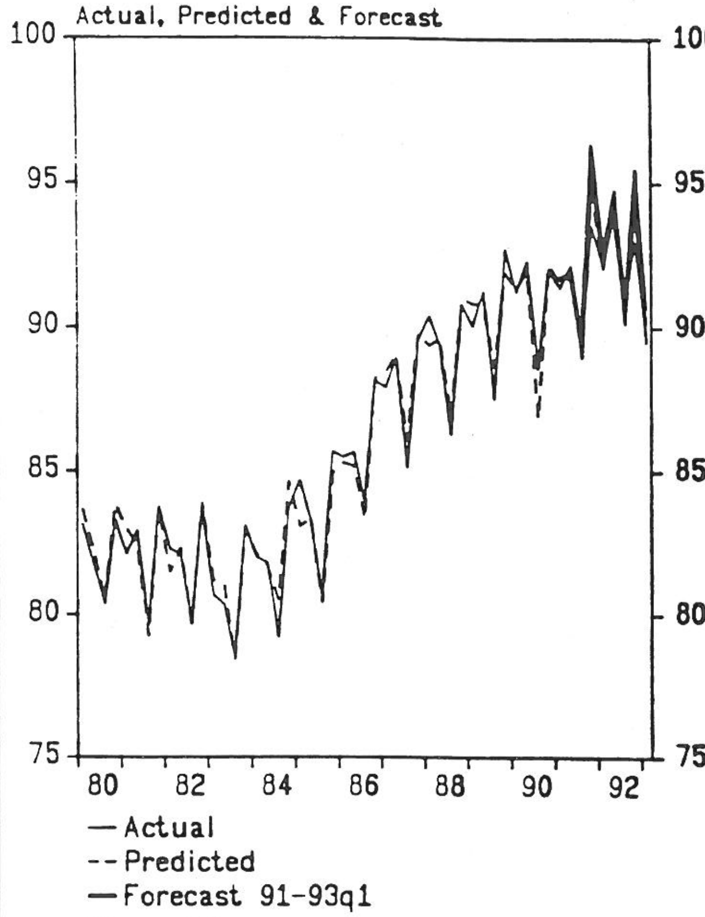
Actual, Predicted & Forecast



Bill. kr 1985p

Exhibit 14: NONDURABLES - Quarterly

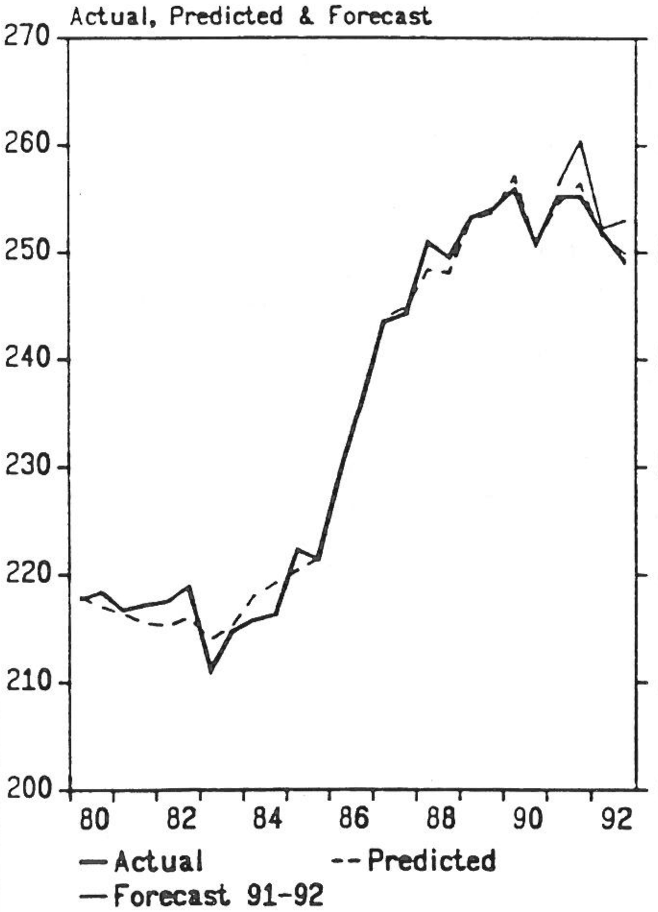
Actual, Predicted & Forecast



Bill kr. 1985p

Exhibit 14: CONSUMPTION - Semiannual

Actual, Predicted & Forecast



Bill. kr 1985p

Exhibit 14: NONDURABLES - Semiannual

Actual, Predicted & Forecast

Bill. kr 1985p

The irrelevance of durables stocks is consistent with the assumption that durables are not wealth. Detecting no special effect of credit deregulation over and above the subtle influences operating through wealth and capital gains, or compositional effects of financial wealth, we infer that the model captures the main factors affecting behavior. We recall, however, that social security effects have not been investigated.

Although the functions for expenditures including and excluding durables are similar, there are interesting differences. This reflects the fact that although nondurable consumption accounts for three-quarters of total expenditure, it accounts for less of the changes in expenditure. The more unstable durables component has also grown faster over the long term.

The tendency for investment cycles in durables to be prolonged may account for the presence of lagged consumption and income change in the quarterly and semiannual versions for total expenditure, respectively, as compared with nondurables. Error-correction appears to be rather fast, indeed suspiciously fast, in view of the size of the coefficient on the consumption ratio one year earlier. The coefficient for lagged C/Y exceeds unity, except in the semiannual total expenditure function, and changes in the consumption ratio induce corrections within the recent year[(10].

There are major differences between total expenditure and nondurables concerning the strength of income and wealth effects. The equilibrium wealth and income elasticities sum to unity [$a_f+a_k k+a_h+a_y=1 \implies e=0$, cf. (1),(1')] for total expenditure, but not for nondurables. The coefficient for income in the dynamic function is insignificant for total expenditure.

Thus the ratio of total expenditure to income or savings rate is implied to be constant for constant rates of growth in wealth, housing stock and income. In constrast, the share of income spent on nondurables should decline over time and the share of spending on durables should rise.

As there are no traces of relative price (deflator) effects, no relative price term enters the nondurables function. Perhaps this may reflect the high level of aggregation in nondurables. However, the same result obtains for each of the durables categories, as will be seen.

The equilibrium income elasticity for total expenditure a_y is nevertheless slightly higher than for nondurables (about 0.55 compared to 0.40). It is the effect of financial wealth and housing assets on nondurable consumption which is weaker, as seems quite reasonable. The similar elasticities for financial wealth and housing assets suggest that total wealth is approximately a geometric mean in the two(11. The recent change in financial wealth is insignificant in the nondurables function, although capital gains in homes have like effects on total expenditure and nondurables. This suggests stronger wealth effects on durables, to be considered below.

The significance of the housing stock on consumption is remarkable. For nondurables as well as total expenditure the stock elasticity is greater than the sum of the elasticities of financial wealth and housing assets in (3'). Consequently, in (3), the importance of the stock of homes is much greater than that of relative home prices for consumption or savings. Nevertheless, the contribution of stock to consumption has been small since the early 80s because stock has changed little (Exhibit 7)(12. Given that the housing stock appears to have an effect on consumption over and above its effect through assets, unless this is no more than a proxy for eg. social security, it would appear that the housing shortage hypothesis is applicable.

Interest rates affect total expenditure negatively through both the level of the long interest rate and the difference between short and long rates, but they do not affect nondurables.

An equilibrium semielasticity of interest of about 0.5 implies that a one percentage point higher interest rate raises the savings ratio by one-half a percentage point. Total expenditure can also be affected through the difference between the short and long interest rates. A rise in the short rate relative to the long rate reduces spending, presumably causing a postponement in purchases of durables, whereas a relative fall in the short rate will speed up purchases.

Since interest terms in the nondurable function are insignificant, the interest sensitivity of total consumption is implied to come from investment spending on durables. Considering the high import content in durables, this implies that a low interest rate policy would boost consumer spending on domestic goods and services only negligibly.

Since the nominal interest rate enters the total expenditure function, this is also the term for the inflation level, ie., the real interest rate and the inflation rate have the same semielasticity. The level of inflation has no significant negative effect on total expenditure beyond the implicit negative influence arising through the nominal interest rate. Where the interest rate is insignificant - for nondurables - the inflation rate is significant and therefore explicit(13. In addition, as is often found, a rise in the rate of inflation has an immediate, direct negative effect on both total expenditure and nondurables, thus boosting savings. As mentioned earlier, the negative inflation term may may represent several factors the relative importance of which is difficult to ascertain.

VAT-change effects are stronger in the total expenditure function as seems reasonable, since greater gains from "timing" may be achieved on durables purchases. Similarly, the larger VAT-effects in the quarterly functions presumably reflect the concentration of intertemporal shifts in purchases between quarters rather than between half-years and the washing out of intra half-year shifts.

The negative growth effect ($-a_g$) on equilibrium consumption is interpreted to signify a higher savings rate in a faster growing economy. The larger value for nondurables suggests that this component of consumption is reduced relatively more than total expenditures. Hence, it suggests that durables purchases, or investments, are relatively prioritized under faster growth. This is consistent on the whole with the same term in the durables functions to be considered below.

III.2 DURABLES

Purchases of durables, like investment behavior in general, proves much more difficult to model. The difficulty may be due to defective measures of stocks and the problem of explaining purchases in a model in which equilibrium is framed in terms of stock. The stock measure is not adjusted for the mean age of its component vintages and "echo effects" due to scrappage of units purchased in past booms.

The dependent variable here, gross investment (purchases) per unit of initial stock, corresponds to the rate of change in stock per quarter or half-year rather than the annual purchases. Correspondingly, the error correction term regards the difference between lagged stock and its determinants. Otherwise, the framework is the same as for the total expenditure function.

The explanatory variables account for 96% of the adjusted variation in the dependent variable for semi & other durables and somewhat less for cars; standard errors are less than one half of a percent. This reflects the limited variation of rates of change in stocks as compared to purchases (cf. Exhibit 5) and perhaps also the seasonality of the dependent variables (lower R^2 is typical of annual change models). Serial correlation in errors is also generally pronounced even at low lags. Although much less perplexity is encountered in different specifications for semi & other durables, Chow tests indicate several structural breaks whatever the specification. Coefficients of many of the explanatory variables of both durables functions display remarkable instability. However, mainly the dynamic features of the model are unstable, in contrast to the income, wealth, interest and inflation terms.

The forecasts for durables (Exhibit 17 and Appendix A1), are grossly inaccurate for individual periods. They are poor for cars, partly because of the apparently erratic seasonal component. Whereas the within-sample predictions for the early 90s are appealing, coefficient changes in the estimates for 1970-90 and 1970-92 cause extreme underpredictions for cars. The car forecasts do not adequately capture the interruption in the plunge in purchases in 1991, but evidently project it to continue further immediately. Partly, this results from the absence of inter-quarterly linkages between current and recent car purchases, which is otherwise characteristic of semi & other durables.

Notable in comparison to the estimates for total expenditure and nondurables are the rather small error-correction coefficients on lagged stocks and the large coefficients for dependent variables lagged one whole year. Though the result is not uncommon for investment functions and a more sluggish response is reasonable in principle for stocks, its degree is disturbing.

EXHIBIT 15 SEMI & OTHER DURABLES: $CSOD/KCSOD_{-1} =$

Quarterly 1970q4-92q4

$$
\begin{aligned}
& \underset{(15.79)}{0.711} \cdot CSOD_{-4}/KCOD_{-5} \\
& + \underset{(3.43)}{0.252} \cdot D^4(CSOD_{-1}/KCOD_{-2}) \\
& + \underset{(2.46)}{0.021} \cdot D^4L(Y) \\
& + \underset{(3.89)}{0.065} \cdot DL(EDVAT) \\
& - \underset{(2.21)}{0.050} \cdot D(D^4L(P)) \\
& - \underset{(3.57)}{0.060} \cdot D^4L(PCSOD/P) \\
& + \underset{(3.29)}{0.009} \cdot D^3L(WF_{-1}) \\
& - \underset{(2.88)}{0.168} \cdot (rs'-rl')_{avg8} \\
& - \underset{(2.90)}{0.022} \cdot L(KCSOD/Y)_{-4} \\
& + \underset{(3.24)}{0.016} \cdot L(Y)_{-4} \\
& + \underset{(2.56)}{0.003} \cdot L(WF/Y)_{-4} \\
& + \underset{(1.91)}{0.022} \cdot L(KH/Y)_{-4} \\
& - \underset{(2.60)}{0.083} \cdot (rl'_{avg4})_{-4} \\
& - \underset{(2.67)}{0.180} + SEAS
\end{aligned}
$$

R^2 (adj)	0.961
Standard Error	0.002
Durbin M	-2.174

Semiannual 1970s2-92s2

$$
\begin{aligned}
& \underset{(2.06)}{0.193} \cdot CSOD_{-1}/KCOD_{-2} \\
& + \underset{(3.61)}{0.334} \cdot CSOD_{-2}/KCOD_{-3} \\
& + \underset{(5.03)}{0.114} \cdot D^2L(Y) \\
& + \underset{(2.92)}{0.077} \cdot DL(EDVAT) \\
& + \ldots \\
& - \underset{(1.83)}{0.059} \cdot D^2L(PCSOD/P) \\
& + \underset{(2.75)}{0.018} \cdot DL(WF_{-1}) \\
& - \underset{(4.06)}{0.434} \cdot (rs'-rl')_{avg2} \\
& - \underset{(3.52)}{0.079} \cdot L(KCSOD/Y)_{-2} \\
& + \underset{(4.60)}{0.076} \cdot L(Y)_{-2} \\
& + \underset{(2.52)}{0.010} \cdot L(WF/Y)_{-2} \\
& + \underset{(2.55)}{0.062} \cdot L(KH/Y)_{-2} \\
& - \underset{(2.87)}{0.172} \cdot (rl'_{avg2})_{-2} \\
& - \underset{(3.37)}{0.898} + SEAS
\end{aligned}
$$

R^2 (adj)	0.964
Standard Error	0.003
Durbin M	-0.111

EXHIBIT 16 CARS: $CAR/KCAR_{-1} =$

Quarterly (1970q4-92q4)	Semiannual (1970s2-92s2)
$- 0.060 \cdot (rl'_{avg})_{-4}$ (1.32)	$- 0.115 \cdot D(CAR_{-1}/KCAR_{-2})$ (1.06)
$+ 0.423 \cdot CAR_{-4}/KCAR_{-5}$ (4.88)	$+ 0.437 \cdot CAR_{-2}/KCAR_{-3}$ (3.64)
$+ 0.109 \cdot L(EDVAT)$ (3.83)	$+ 0.062 \cdot DL(EDVAT)$ (2.11)
$- 0.032 \cdot L(DVAT)$ (1.08)	$+ 0.275 \cdot D^2L(Y_{avg6})$ (3.81)
$- 0.102 \cdot D(D^4L(P))$ (3.92)	$- 0.132 \cdot D(D^2L(P))$ (3.16)
$- 0.035 \cdot D^4L(PCAR/P)$ (4.05)	$- 0.055 \cdot D^2L(PCAR/P)$ (3.24)
$+ 0.008 \cdot D^3L(WF_{-1})$ (2.04)	$+ 0.013 \cdot DL(WF_{-1})$ (1.63)
$- 0.406 \cdot (rs'-rl')_{avg}$ (6.67)	$- 0.663 \cdot (rs'-rl')_{avg2}$ (5.21)
$- 0.034 \cdot DL(KCAR/Y)_{-1}$ (4.78)	$+ 0.027 \cdot D^2L(PH/P)$ (1.84)
$- 0.045 \cdot DL(KCAR/Y)_{-2}$ (4.50)	+ ...
$- 0.051 \cdot DL(KCAR/Y)_{-3}$ (4.24)	+ ...
$- 0.117 \cdot L(KCAR/Y)_{-4}$ (7.89)	$- 0.186 \cdot L(KCAR/Y)_{-2}$ (7.51)
$+ 0.018 \cdot L(WF/Y)_{-4}$ (9.04)	$+ 0.019 \cdot L(WF/Y)_{-2}$ (3.97)
$+ 0.070 \cdot L(KH/Y)_{-4}$ (6.66)	$+ 0.147 \cdot L(KH/Y)_{-2}$ (6.99)
$+ 0.057 \cdot L(Y)_{-4}$ (7.08)	$+ 0.040 \cdot L(Y)_{-2}$ (2.26)
$- 0.771$ + SEAS (7.43)	$- 0.729$ + SEAS (3.21)

	Quarterly		Semiannual
R^2 (adj)	0.838	R^2 (adj)	0.907
Standard Error	0.003	Standard Error	0.003
Durbin M	-1.179	Durbin M	-1.999

Exhibit 17: SEMI & OTHER DURABLES
Quarterly: Actual, Predicted & Forecast

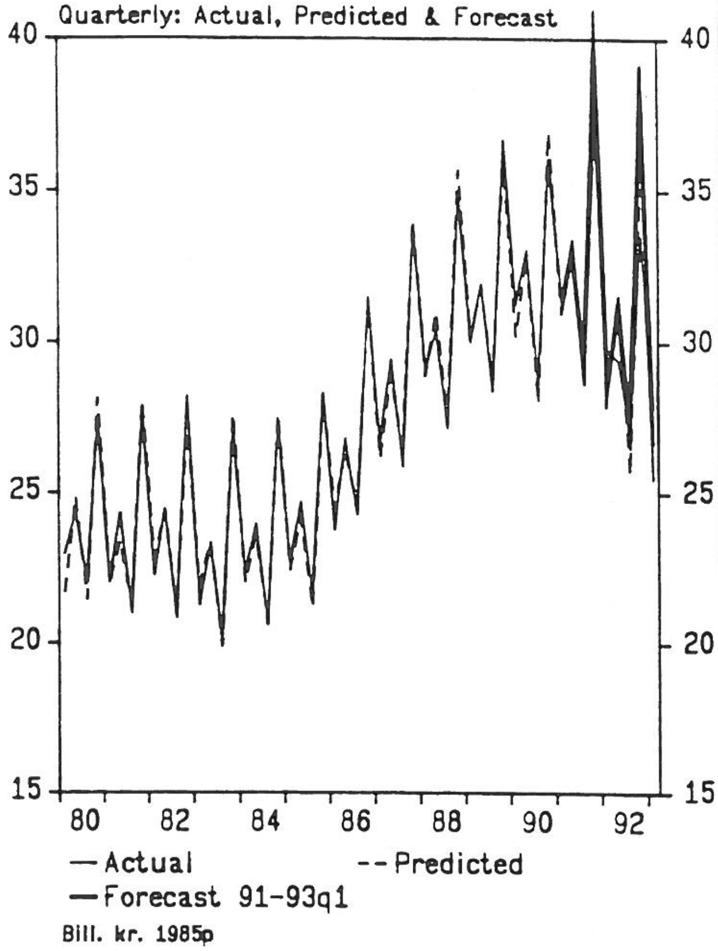


Exhibit 17: CARS
Quarterly: Actual, Predicted & Forecast

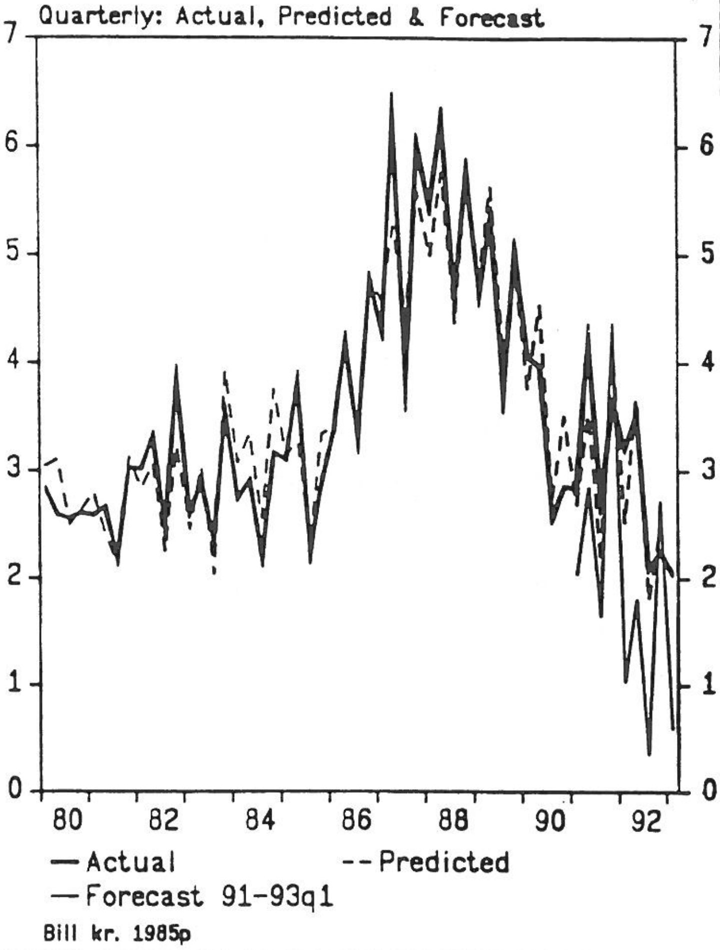


Exhibit 17: SEMI & OTHER DURABLES
Semiannual: Actual, Predicted & Forecast

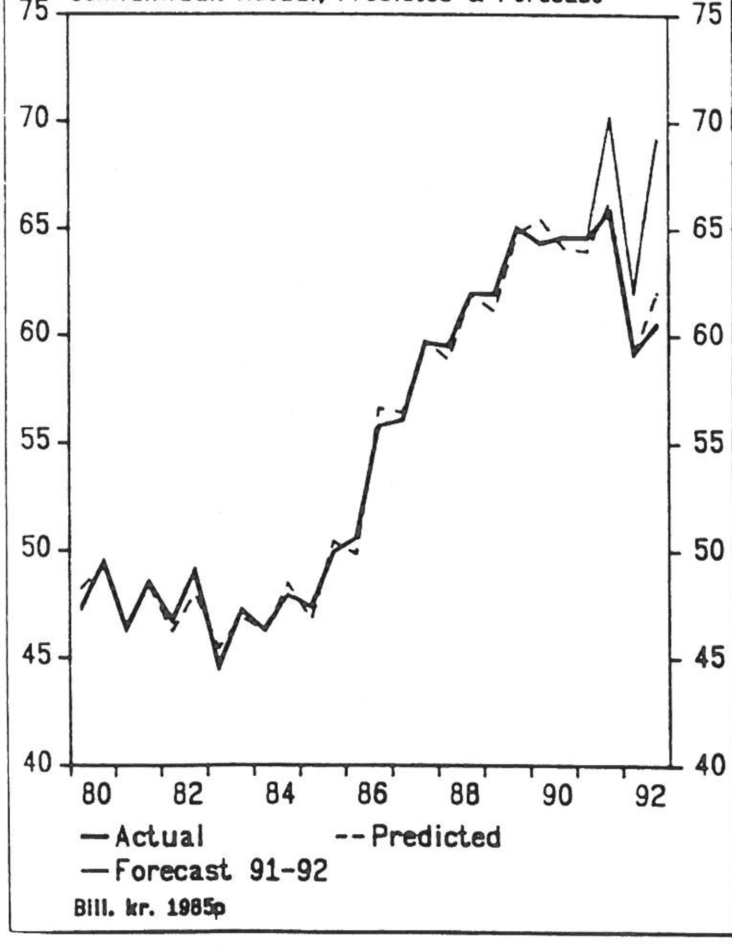
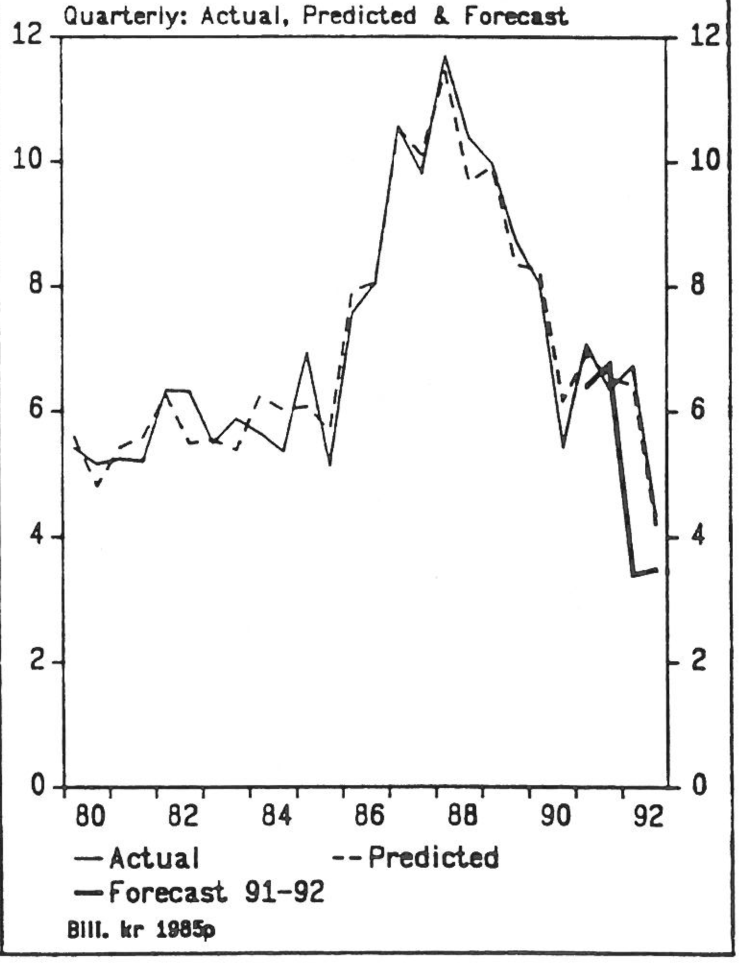


Exhibit 17: CARS
Quarterly: Actual, Predicted & Forecast



The durables functions do not indicate significant effects of housing prices in contrast to the total expenditure and nondurables functions. Thus, contrary to hypothesis, neither capital gains in housing nor housing assets appear to have contributed to the investment cycle in durables in the 80s or early 90s. In contrast, net financial wealth and the stock component of housing assets are of estimated importance for both types of durables.

Like the equilibrium elasticity of financial wealth, the equilibrium elasticity of housing stock is very large. These elasticities are difficult to assess precisely because the estimates are sensitive to the value of the small error-correction coefficient which enters the denominator of the computation. Although housing prices are absent from the equilibrium relationships here, the sum of the elasticities for wealth, housing stock and income exceed unity, indicating a rising share of durables with expansion over the long term. This is reasonable and consistent with the results on total expenditure and nondurables.

Surprisingly, relative price levels of durables are not significant, although relative price changes are. Thus it appears that purchases of durables are approximately price inelastic, whereas their timing is affected by price changes[(14]. The VAT-change terms also indicate such timing effects, although somewhat surprisingly, they are not particularly pronounced for cars. This may be reflect the omission of excise taxes on car purchases in this model.

In agreement with the total expenditure function, interest rates have strong effects on semi & other durables, both as regards interest rate levels and the interest gap. Yet for cars, like car price levels, the interest rate level is not significant. This result may be related to credit rationing and hire-purchase rules, which may have been of particular significance for car purchases before 1986[(15].

Otherwise, as is the case for semi & other durables, the disparity between short and long term interest rates has a robustly strong effect on car purchases. Hence, it appears that the relation between short and long term interest rates in the short term, perhaps as an indicator of credit squeeze, is effective in determining the timing of durables purchases.

The above functions provide insights into the proximate forces affecting consumption and its major components. The estimates may be useful for the interpretation of events, but in view of coefficient instabilities and autocorrelated residuals, their major implication for durables is "instability" in behavior. Consumption behavior depends on many factors which can be investigated; but in the event, the models may be overparametrized when several factors are introduced and the estimates are not more stable when they are suppressed. Using the durables functions for short term forecasting is highly risky. Perhaps they may be improved with the introduction of survey data (cf Ågren & Jonsson [1991], Jonsson & Ågren [1992]), which is an important direction for further investigation. Since the somewhat imprecise long term relationships yield structural insights, they might be helpful, if used with caution, for medium term assessments. In the next section we examine the reasonableness of projections made with the present models.

IV. FORECASTS AND PROJECTIONS 1993-1998

A really "dynamic" consumption forecast would endogenize wealth, incorporating the effect of current savings on wealth, to draw implications for future savings via the effect of wealth on consumption. It would go further than the forecasts for the early 90s, discussed earlier, in which the only feedback is from lagged consumption. This section deals with forecasts in which wealth is endogenous.

By the nature of error-correction, deviations of the consumption or savings ratio from the long term course determined by wealth, etc., in the equilibrium function, are self-correcting. If high current consumption results in negative savings, wealth is decumulated. In time, lower wealth reduces consumption and the saving rate rebounds. Likewise, if the high savings ratio in the beginning of 1993 is exceptional, relative to the long term course of wealth to which it leads, the large accumulation of wealth will in time raise consumption and reduce the savings ratio again.

In the following, using the quarterly functions, we forecast consumption and savings over the period 1993-94 and make medium term projections for 1995-98 -- see Exhibit 18. The assumptions behind the forecasts are based on the NIER March forecast [1993] with updates for preliminary consumption figures and interest rates through 1993q1 and the share price index through 1993q2. Comparisons for 1993-94 are to the NIER forecasts, which differ negligibly from Ministry of Finance forecasts of April 1993. The assumptions behind our medium term projections are essentially the Ministry's [1993] and comparisons are to Ministry (FI) figures for 1995-98. For simplicity, both "forecasts" and "medium term projections" are referred to as "projections" below.

EXHIBIT 18 FORECASTS & PROJECTIONS FOR 1993-1998

Annual rates of change and savings rates in percent using the quarterly models in two modes:
Sum: total consumption as sum of nondurable and durables.
Agg: total consumption from the aggregate function.

		1992	1993	1994	1995	1996	1997	1998
Income (Y)		3.1	-3.8	-0.5	1.6	1.7	1.8	1.8
Prices (P)		2.0	5.9	3.9	2.3	2.4	2.4	2.5
Homes:								
price (PH)		-15.5	-12.7	-4.9	0.0	5.1	4.1	4.1
stock (KH)		0.3	-0.6	-1.1	-1.1	-1.1	-1.1	-1.0
Interest rate:								
long (r_l)		12.9	8.7	7.8	7.5	7.5	7.5	7.5
short (r_s)		10.4	9.1	8.1	7.5	7.5	7.5	7.5
Share price		-0.5	23.9	7.9	4.0	4.0	4.0	4.0
Real savings rate (SR/Y)		-1.3	-2.2	-1.8	-1.2	-0.8	-0.5	-0.4
Fin.wealth								
(WF)	Sum	2.3	17.1	8.4	6.4	4.7	3.9	3.7
	Agg	2.3	15.5	5.0	3.8	3.1	3.1	3.2
Savings rate								
(S/Y)	Sum	8.1	8.0	8.2	7.6	6.6	6.1	6.3
	Agg	8.1	6.0	4.0	3.9	3.8	4.2	4.8
	NIER/FI	8.1	7.8	7.8	7.0	6.2	5.2	4.1
Consumption								
(C)	Sum	-1.9	-3.7	-0.7	2.3	2.9	2.3	1.6
	Agg	-1.9	-1.7	1.7	1.8	1.7	1.4	1.2
	NIER/FI	-1.9	-3.5	-0.5	2.0	2.5	3.0	3.0
Nondurable								
(CND)	Sum	1.0	-3.7	0.6	1.6	1.1	0.9	0.7
	Agg	1.0	-3.7	0.5	1.5	1.0	0.0	0.7
Semi&Oth Dur								
(CSOD)	Sum	-8.2	-4.5	-9.7	0.6	8.6	8.2	6.6
	Agg	-8.2	-4.5	-10.1	0.2	8.3	8.8	6.5
Cars								
(CAR)	Sum	-17.5	3.3	48.7	27.0	5.2	-5.6	-11.6
	Agg	-17.5	3.0	46.7	25.0	3.8	-6.3	-11.6

Note. Forecasts for 1993 include actuals for 1993q1. NIER/FI is NIER [1993] for 1993-94 and Ministry scenario [1993] for 1995-98. Assumptions for 1995-95 are from the latter.

The projections are conditional on assumptions for the future course of explanatory variables whose development is not explained within the model: disposable income, the consumption deflator, housing prices, interest rates and the marginal tax rate, investments for housing stock, share prices and VAT change (v=.02 1993Q1). The assumptions on interest rates, share and home prices, and prices of durables are ours and are essentially technical.

Assumptions are also necessary about the distribution of savings into disaggregated wealth, since we have no portfolio model. Since housing stock and price are exogeneous, so are housing assets. Consequently, feedback from current savings S=Y-C to wealth here affects only financial wealth (WF). Changes in end-period financial wealth depend on the share of savings going into financial savings and on current capital gains on shares.

Financial wealth is determined as follows, quarter for quarter, where the suffix "L" indicates items in current prices. SFL is nominal financial savings, the transaction change in total financial wealth (NA definition), SRL is nominal "real savings" (net investment in private homes and small businesses), WFAL is nominal shareholdings, q is the quarterly rate of change in the general share price index, and (a,b,c) are assumed parameters explained below:

$$
(5)\quad
\begin{array}{ll}
\text{(i)} & SL = P\cdot S = P(\,Y - C\,) \\
\text{(ii)} & SFL = SL - SRL \\
\text{(iii)} & WFL = WFL_{-1} + a\cdot SFL + b\cdot q\cdot WFAL_{-1} \\
\text{(iv)} & WF = WFL/P \\
\text{(v)} & WFAL = a\cdot c\cdot SFL + (1+b\cdot q)\cdot WFAL_{-1}
\end{array}
$$

Current forecast consumption (C) begins in 1993q2; see Exhibit 18. It is alternatively "Agg" from the quarterly aggregate function of Exhibit 12, or the "Sum" of nondurables and durables (CND+CSOD+CAR, Exhibits 13,15,16).

Consumption, together with assumed real income and the consumption deflator (Y,P) determines net savings in current prices (SL) in (i). Given real savings (SRL, linear interpolation of NIER annual forecast[16]), nominal financial savings (SFL) is determined residually (ii). Assume $a=b=1$ (for the moment). End-period nominal net financial wealth is then initial wealth plus current financial savings plus capital gains on initial share holdings (iii). Real financial wealth is deflated nominal financial wealth (iv). The same identity as for nominal total wealth holds for shares (WFAL) except that transactions are expressed as a proportion c of total financial savings (v).

Since the composition of the household share portfolio is not the same as in the general share price index (from the Swedish journal Affärsvärlden), parameter b may not equal unity. We assume $b=0.7$ is more representative (though perhaps also too high). Parameter c is potentially quite unstable because it represents a ratio of net transactions both of which can be positive, negative or zero. After some regressions and experimentation, we set $c= -0.3$. This signifies net sales of shares equal to 30% of positive net financial savings.

Parameter a would be identically unity if the national and financial accounts were fully consistent. They are not so, however. Financial savings according to the financial accounts are likely to be less than according to the national accounts for 1992-94. Hence, part of currently high saving is not likely to be registered as financial wealth according to the financial accounts (the source of our financial wealth variable). Observing a weak connection between gains and share price changes in the data, we assume the pass-through from financial savings (NA) into financial wealth is 70%: $a=0.7$. Higher figures for a and b would imply higher levels of wealth in the 90s, as would smaller sales (or purchases instead) of shares, leading to higher consumption levels from the outset.

The forecasts and projections by the "sum" approach are closest to the NIER forecasts and the Ministry projections for all years except the last. It appears that the hyper-correctiveness of the aggregate function quickly corrects tendencies toward exceptionally high savings rates, precluding a larger fall in consumption in 1993.

The sum-forecasts appear to be most accurate for preliminary consumption data for early 1993, despite the forecast too early recovery in car purchases from the faulty car equation. The suspiciously weak correctiveness of the durables functions makes for a more credible total consumption forecast. The forecast is in good agreement with the OECD's [1993] consumption forecast of -3.9% and -0.3% for 1993-94.

Projections by both methods agree with the Ministry scenario on a decline in the savings rate from the exceptional level attained in 1992. Unlike the Ministry's scenario of persistent decline, however, both model projections suggest a stabilisation in the savings rate at about 5 - 6 % in 1998.

These and other implications are of course conditional upon the assumptions for the explanatory variables, many of which are merely technical, eg. for asset prices and interest rates. For example, if interest rates are one percentage point lower than assumed above from 1995, both simulation approaches indicate rises in durables purchases which reduce the savings rate by 0.1 percentage point in 1996, and 0.3 percentage points thereafter. Since interest rates could fall by much more, savings rates could be correspondingly lower too.

V. CONCLUSION

In this study we have developed aggregate and disaggregate consumption functions for interpretation of consumption and saving behavior in forecasting and medium term analysis. The models yield predictions through 1998 which are similar to those of the NIER and the Ministry of Finance. Though several obscurities remain, the functions contain many of the factors theoretically and commonly traditionally believed to influence consumption. Evidently, financial wealth and housing assets are important determinants, which if omitted in explanation, can give the misleading impression that the basic income-expenditure relationship does not hold. Variations in asset values contribute to short term instability. Interest rates - after tax - are not irrelevant if their role is assessed in this context, although their assessed effects are unstable over time. Inflation and increases in inflation apparently boost savings, partly through nominal interest rates, and VAT-increases induce temporary hoarding. Rises in short interest rates relative to long rates and acceleration in inflation also induce postponements in purchases.

Aggregate and nondurable consumption are more easily modelled than durables. These functions are more stable and forecast better than those for durables. Although models for the former exhibit "hyper-correctiveness", ie., rather too fast a reallignment after deviations from the main course of consumption, this aspect (entangled with seasonality) is not a critical feature. Dropping it would likely improve forecasting performance.

Purchases of durables, on the other hand, mainly cars, are a much more difficult matter. Although these estimates agree on the whole with those for aggregate and nondurable consumption, durables functions exhibit instabilities, weak or absent responses to relative prices or housing assets, and interest sensitivies which are not easily interpreted.

When housing assets are disaggregated into real prices and stock, the price component is revealed to be less important for consumption than the stock component. Though not surprising in itself, this implication is equivalent to the more striking finding that housing stock exerts a positive influence on consumption beyond that attributable to housing assets. We submit that a larger private housing stock, under shortage, reduces the need for housing investment, thus reducing savings and raising consumption expenditure. The housing stock effect, however, may well proxy other forces related to trends in social security in a wide sense.

Even if taken at face value, the housing stock effect is at most a transitional feature of behavior in a very long term perspective, since the effect is related to an evaporating shortage and the private housing stock is not likely to increase indefinitely. In time, the consumption ratio would tend to fall and, with a higher savings rate, financial wealth would rise steadily relative to income. Hence, the parameters of estimated consumption or saving behavior are subject to change. Indeed, the development of housing demand and stock should properly be explained within the same model.

In further studies, demand and price formation for both rental and private housing, social security, and unemployment should be brought into the picture, as these factors may induce shifts in behavior. The omission of in particular the last two items may underly the mildness of forecast decline in consumption in 1993, as compared to preliminary estimates at the time of writing. A more thorough analysis is also warranted into the statistical properties of the relevant series from the standpoint of error-correction modelling, and into the potential role of expectations formation (including survey expectations). Survey data on household purchase plans (HIP) might be useful in achieving improvements.

NOTES

1} This measure of household or "private" housing assets is a simple one among several conceivable alternatives. In the perpetual inventory stock, all construction of so-called "small houses" (småhus), including secondary homes (fritidshus) are treated as owned by households. Apartment houses or "flats" (flerbostadshus) are regarded as rental housing. This excludes owner-occupied flats and household ownership of flats for rental from household housing assets, but includes indirect ownership of small houses through nonprofit organisations (bostadsrättsföreningar). Official statistics for the latter, indirect type of ownership (bostadsrätt) treat it as a financial holding, not a housing asset. The market price index (fastighetsprisindex) covers only direct ownership (egnahem) including second homes, not indirect ownership. The perpetual inventory stock is our measure interpolated from benchmarks based on Statistics Sweden's previous stocks, which have since been revised. Our stock and price series appear in the data appendix. See note 3.

2} In estimation, we also considered income per capita (Y/N, N: population index 1985=1) as the appropriate variable. In this case, if e<0, S/Y rises with income per capita and C/Y rises with the support burden (N/Y). Since the results are similar, we hold to the simpler formulation.

3} The rental housing stock (KF, F for "flats" or flerbostadshus) is also relevant; see Exhibit 7. Obviously, there is a substitutional relationship between KH and KF, which is quite complex, being affected by subsidies, and changes over time. Rental housing has typically been regulated in Sweden. KF has developed somewhat differently from KH. As is evident in Exhibit 7, growth in KH proceeded during the crisis years of the late 70s, when relative price was high, but declined; whereas KF grew slowly as a reserve of unlet flats appeared. This pattern of development became reversed from about the early 80s when tax reform reduced interest deductions on owner-occupied housing, apparently inducing substitution in favor of rental housing. The increase in KF probably dampened the later surge in prices of private homes and hastened their decline in the early 90s.

Strictly, demand for total K=KH+KF and relative demand for KH and KF should be included in the analysis. We dodge this issue because of its complexity. Demographic aspects are also relevant. Though not reported, we have also estimated the model using stock (or assets) adjusted for population (KH/N, corresponding to Y/N, note 2), obtaining similar, even better results, probably because of the flatter path of KH/N in the early 90s. Indeed, the findings are more impressive if total stock adjusted for population K/N replaces KH/N or KH in the model. Since the findings reinforce our major points, but drive the analysis more afield, we abstain from complicating the issues.

4} It might seem more proper to remove the real price level from the equilibrium model to the dynamics of consumption. However, price movements can be quite prolonged in calendar time (Exhibit 7). In any case, the sense of the equilibrium model is not altered if the relative housing price term reduces to a constant in steady state, since the constant merges into the scale term. Moreover, the same basic reasoning about transitory components applies to financial wealth, including transitory stock market values for which price and volume components cannot be separated. In principle, one could entertain the question of breaking up every item in the model into a "transitory" and "permanent" component.

5} An arbitrary implication of the disaggregation of total wealth is also worth mention. Debt is netted here against financial assets to obtain net financial wealth (WF) and housing assets (AH). Alternatively, were debt netted against housing assets, we would have net housing wealth (WH) and financial assets, gross (AF). We hold to the present aggregates mainly because this maintains consistency with financial savings in the financial accounts, obviating special treatment of debt in analyses (see section IV).

Both variants yield similar overall empirical results (not reported). However, coefficients and t-values are lower for whichever asset is expressed "net". The alternative variant with net housing assets might be more correct for the earlier part of the observation period, before deregulation, when credit was prioritised for housing and presumably most debt was in mortgages. Under later and present circumstances debt (including mortages) may be incurred for general purposes, including financial investments.

6} Combinations of two different interest rates and three different tax rates have been considered: a short interest rate (treasury bills), a long one (treasury bonds), two marginal income tax rates and an average tax rate. The short term interest rate generally yields marginally higher t-values if no distinction is made between the dynamic and long term consumption behavior. Both rates seem applicable if the long rate enters the equilibrium model and the disparity between the short and long rates enters as an indicator of credit availability dynamics. We have not considered deposit or lending rates of financial institutions because of difficulties of measuring rates correctly during the period of credit regulation.

The average tax rate and one marginal tax rate were mean rates computed from tax returns (Statistics Sweden), whereas the second marginal rate is the statutory maximum applicable to interest deductions on tax returns, reduced in the late 80s from 50% to the current 30%. The two marginal tax rates are identical for the 70s and 90s.

Interest taxation was "asymmetric" in most of the 80s. Above a threshold, if positive, net interest income was marginally income-taxed at rates above 50% for higher income households. For deductions, a 50% tax rate was the ceiling. Incurring marginal interest income, previous borrowers already having substantial interest deductions, paid a maximal 50% on reduced deductions. For them, tax was therefore symmetric at 50%. In initial experiments, the maximal rate on interest deductions proved substantially superior to the mean average rate and slightly superior to the mean marginal rate.

The expected future tax rate should be more relevant because this is the rate applicable to interest deductions or interest income when incurred. Implementation of the asymmetrical tax in the 80s was preceeded by notoriety during political negotiation and phased in, probably establishing reasonably firm expectations for the future, so we set the rate at 50% already in 1980. Since, in general, the rate one year ahead in time is rather easy for households to assess and raises t-values, it was used.

7} Specifically, if the term $a_r \cdot (r' - p) + a_p \cdot p$ appears in a function, the estimates $a_r = a_p$, whereas if $a_r \cdot r'$ is present and the regressor p is added, a_p is insignificant. Here, p is the log change in the consumption deflator. The change in the consumer price index (kpi) is an alternative inflation measure. The kpi measure yields similar estimates - except for the interest rate which falls substantially in significance - probably because interest rates affect the kpi more. Using of the consumption deflator makes interest and inflation rate effects more distinct.

8} Housing investment was crowded out by construction in the business sector, which was relatively more profitable owing to refusal of the authorities to permit subsidies for expensive housing investments, mainly for rental housing. This may have induced some shift of demand to private housing. The government attempted to alleviate the situation by imposing building controls on the business sector, but the controls did not take effect immediately. A complicating additional factor in situations of increasing demand and price, noted by Hendry [1984], is for potential sellers to hold back supply in anticipation of further price increases, thus driving prices up even more. Similarly, turnover can fall when prices decline as potential sellers become "locked in" and buyers wait for prices to hit bottom, causing prices to fall more. For these reasons, measured prices may not coincide with households' actual evaluations of asset values. This defect in the price measure seems unavoidable.

9} Surprisingly, official measures of mean VAT rates over all components of consumption do not exist. Our estimate, from the Business & Industry Information Group (Näringslivets Ekonomifakta), measures the typical VAT rate. It is inaccurate especially for subaggregates and when rates change. From the 90s, we use our own rough estimate.

10} This result is consistent over different estimation periods through 1992. The error coefficient could of course be constrained down to unity. For total expenditure, it falls to about 0.75 if the lagged changes in the consumption ratio are suppressed. This hardly affects the standard error as the seasonals take over the effect. Suppression might be appropriate because the hyper-correctiveness of the total expenditure function seems to cause overestimation in forecasting 1993; see section IV.

11} If total wealth is defined as the product of net financial wealth and housing assets, W=WF·AH (ie., $a_f=a_h$), the constrained version suffers some slight loss of fit. If total wealth is the sum, W=WF+AH, even with housing stock in the function, the t-value for total wealth is less than unity.

12} Equations (3) and (3') or (5) and 5') are equivalent because KH appears in both. However (see note 3), taking (3') as the point of departure, the stock term in (3') need not be limited to KH, but could be replaced with stock adjusted for population, KH/N, or the total stock K or the latter adjusted for population, K/N. Replacing KH with KH/N improves overall significance, except for the interest rate, and replacing it with K/N raises t-values overall, especially for the stock term. This looks like a promising area for further investigation.

13} Were it not for the explicit inflation term for nondurables, the indirect inflation effect on total expenditure through nominal interest might appear to be more a question of interpretation.

14} In addition, a change in price has a permanent effect on demand unless it is later followed by a price change in the opposite direction. At least for semi & other durables, the downward trend in prices (ie. negative mean change) explains part of the upward trend in purchases and stock (Exhibits 5 and 6).

15} Actually, we tried dummies for car taxes and hire purchase rules reported in Berg [1990], but without success.

16} From 1995 on we assume that (negative) real savings is 70% of their value in the same quarter one year earlier. Given positive net savings 1993-98, less negative real saving implies smaller financial saving.

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APPENDIX

AI. FORECAST STATISTICS

Forecasts: 1991q1-93q1 from quarterly models and 1991s1-92s2 from semiannual models estimated on 1970-90

	Tot Cons.		Non. Dur.		Cars		Other Durs.	
	Q	S	Q	S	Q	S	Q	S
MPE	0.5	-1.0	-0.6	-1.4	36.5	18.0	-2.4	-6.4
MAPE	1.8	1.0	0.9	1.4	45.9	21.4	4.1	6.5
MAE/MAD	33	70	36	288	143	74	35	149
THEIL-U	0.58	1.12	0.64	0.87	3.59	1.71	0.51	1.02
R^2	88	64	85	33	36	27	89	24
CV	1.5	0.9	0.7	0.7	22.0	21.0	3.8	5.4

All figures except Theil-U in percent.
Number of periods: 9 for Q-quarterly, 4 for S-semiannual

MPE:	mean percentage error
MAPE:	mean absolute percentage error
MAE:	mean absolute error
MAD:	mean absolute deviation of actuals
THEIL-U:	Theil inequality coefficient (zero-infinity)
R2:	Determination coefficient, actuals on forecasts
CV:	Standard error/mean, regression of actuals on forecasts.

The quarterly models, except for cars, forecast better than the semiannual models, which overestimate on the whole, though the semiannual car function also underestimates. The car forecasts miss the slowdown in downturn in 1991 (when household expectations became temporarily much less pessimistic), plunging on ahead. The better forecasts are at best more than moderately accurate rather than highly accurate from the standpoint of the Theil measure, which is poor when it exceeds unity. R^2 measures give less information about the semiannual forecasts (4 obs).

AII. TESTING FOR INTEGRATION AND COINTEGRATION

The statistical analysis of the series of the model below is rudimentary and explorative. It is essentially an exercise, but the implications are important, at least for further development of the model. Below we examine the order of integration and cointegration of the basic variables of the model. In brief (see Alogoskoufis & Smith [1991], Dolado et al. [1990], Engle & Granger [1987]), we seek to establish whether the log of each of the main variables, consumption (C), nondurables (CND) or durables stocks (KCAR, KCSOD), income (Y), financial wealth (WF), housing assets (AH) and housing stock (KH) and the after-tax long interest rate (r_1') is integrated of order one I(1) and, if so, whether the series are jointly cointegrated. By I(1) is meant that a series - call it Z - has a unit root, ie., is nonstationary of first degree. By cointegrated is meant that the series of errors z from a regression of consumption or other dependent variables on the other variables is stationary. We confine ourselves to quarterly series.

AII.1 INTEGRATION

The procedure applied here to test for integration is to examine the estimated regression

$$\text{(AII-1)} \quad DZ_t = a + seas + b \cdot T_t + d \cdot Z_{t-1} + c_1 \cdot DZ_{t-1} + c_2 \cdot DZ_{t-2} + \ldots + c_k \cdot DZ_{t-k} + u_t$$

for a unit root. $DZ_t = Z_t - Z_{t-1}$ and k=8. A constant (a) and trend (T) may be present. In the equivalent regression with levels of Z on the left hand side, the coefficient on the lagged dependent variable would be r=1+d; hence, d=-(1-r) in (AII-1). The null hypothesis of non-stationarity is the presence of a unit root: r=1 ==> d=0.

Exhibit AII.1: Integration Tests - t-values
Minus signs dropped

	Constant and Trend			With Constant		Neither
Variable	Const	Trend	Z_{-1}	Const	Z_{-1}	Z_{-1}
C	2.36	1.98	2.35	1.40	1.39	1.04
CND	2.08	1.91	2.07	0.84	0.82	1.81
Y	2.14	2.16	2.13	0.48	0.47	1.39
WF	1.97	1.49	2.00	1.62	1.62	0.06
AH	3.28	0.34	3.26	3.43	3.43[b]	0.34
KH	0.97	0.86	0.92	3.28	3.28[b]	0.25
rl'	2.48	2.28	2.51	0.94	1.03	1.09
PH/P	3.79	3.35	4.01[b]	1.68	2.20	1.58
PCAR/P	1.15	0.42	1.84	1.50	1.82	1.04
PCSOD/P	0.95	0.43	1.02	3.10[b]	2.22[c]	0.12
KCAR	2.67	2.43	2.66	1.41	1.39	1.15
CAR	1.82	0.22	1.79	1.97	1.98	0.37
KCSOD	2.74	2.17	2.71	2.25	2.24	0.71
CSOD	3.04	2.35	3.02	2.11	2.10	0.36

Note: The null hypothesis is "no integration". t-values for unit root tests in the table are negative. Critical values for t-tests (from Fuller [1976] p. 373) for 100 observations at 5% significance levels for the three cases above are -3.45, -2.89, -1.95; at 1 % they are -4.04, -3.51, -2.60.
a) Significant (1%); b) Significant (5%);
c) Significant (5%) - standard normal distribution.

For stationary Z: $r<1 \Longrightarrow d<0$ in (AII-1). If $d<0$ significantly, the null hypothesis is rejected in favor of stationarity in which case there would be no cointegration. Since, constructed perpetual inventory stocks should be integrated of the same order as their corresponding flows (purchases), purchases are included here.

The t-values for estimated a,b and d are presented in Exhibit AII-1. Three cases are displayed: the most unrestricted (a,b,d), no-trend (a,0,d) and neither (0,0,d). We follow the sequential decision rule recommended by Dolado et al. ([1990, pp. 254-255): Check the most unrestricted version for a unit root using the Fuller [1976] table (p373). If significant, stop. If not, check the significance of trend (Dickey-Fuller [1981] (p.1062); if trend is significant, recheck for a unit root using a standard-normal table; if significant, stop. If not significant, move to the next most unrestricted case and follow the same procedure, if necessary for the constant, as was done for trend in the foregoing, and so on.

The null hypothesis can be rejected for home prices (PH/P) and stock (KHH), hence also assets (AH), at somewhat under the 1% level. Also, relative price of semi & other durables is significant-stationary at 5%. However, the latter was insignificant in the durables model.

Stationarity in housing is anticipated in the arguments of section II, which interpret housing controls and shortage as a gradually weakening constraint on consumption. The economy may be likened to a hybrid of constrained and free versions of the model, with the growth in stock/assets function as a sort of smoothed transitional dummy. As time goes by, one would expect the economy to free itself of the constraint and the housing component of the model to merge with the scale term of the equilibrium model, leaving only transitory effects.

AII.2 COINTEGRATION

In the first stage of the Engle-Granger [1987] test a cointegration regression is run in (log-)levels of consumption expenditure, etc. against all the right hand side variables of the equilibrium model, income, financial wealth, housing assets, housing stock, and the after-tax long interest rate. Housing is treated as nonstationary, contrary to the implications above, as if households were in the earlier phase of constrained consumption even in the late 80s and 90s. Purchases of cars and semi & other durables are included for the sake of comparison. In the second stage, the regression residuals Z from first stage enter a regression as in (AII-1) above. There are two cases, including and excluding trend. The null hypothesis of non-cointegration corresponds to the hypothesis that Z is I(1). Rejection of the null implies cointegration, which amounts to a statistical warranty for the equilibrium and the error-correction scheme.

The estimates indicate that total consumption expenditure and also nondurables are cointegrated with the explanatory variables of the equilibrium model for at least the 5% significance level, and almost the 1% level. (The sum of elasticities is almost exactly unity for total consumption.) However, both stocks of durables are not indicated to be cointegrated with the explanatory variables. In contrast, were it possible to formulate a model for the purchases (flows) of durables in terms of the same variables, the purchase model would be admitted by the cointegration criterion here.

Exhibit AII.2 Cointegration: t-values for Z_{-1}
Minus sign dropped

C - total consumption		CND - nondurables	
trend	5.57	trend	6.09
no-trend	5.60	no-trend	6.13
Stocks:			
KCAR - cars		KCSOD - semi & oth. durs.	
trend	2.17	trend	3.70
no-trend	2.16	no-trend	3.73
Purchases:			
CAR - cars		CSOD - semi & oth. durs.	
trend	5.81	trend	6.68
no-trend	5.86	no-trend	6.72

Note: The null hypothesis is "no cointegration". All t-values are negative. The critical values (from Mackinnon [1990]) formula) with and without trend, respectively, are t(5%)= 5.23 and 4.91 and t(1%)= 5.89 and 5.56.

This is odd, since both stocks and flows are I(1) (given positive depreciation rates). In a steady state, purchases and stock would be proportional, eg. where d stands for a depreciation rate and g is a steady state growth rate, $CAR=(g+d)\cdot KCAR_{-1}$. Very likely, the results reveal the inadequacy of the perpetual inventory stock measures, which probably display excessive sluggishness because of the assumption of a constant depreciation rate. This sluggishness has its counterpart in the rather small error-correction coefficients of the estimated dynamic model, perhaps thus revealing that the error-term of the model is inaccurately measured. As seen in section III, the durables functions have several weaknesses.

AIII. DATA

L-suffix on series name stands for current price.

CL: Total private consumption, mill.

1969Q1	:	19314	21219	20652	23695
1970Q1	:	21379	23142	22579	26127
1971Q1	:	22571	24870	24624	28373
1972Q1	:	26179	27344	26665	30359
1973Q1	:	28337	30266	29443	33929
1974Q1	:	31340	34627	34848	38288
1975Q1	:	35982	39060	38774	44778
1976Q1	:	42163	45596	44222	51431
1977Q1	:	46841	49980	48224	56020
1978Q1	:	52241	55151	53644	61812
1979Q1	:	57788	61104	58650	68831
1980Q1	:	65908	66956	66191	74275
1981Q1	:	72816	76370	73065	83301
1982Q1	:	81486	84790	80460	93300
1983Q1	:	88015	91456	88245	101726
1984Q1	:	97995	101101	95399	109280
1985Q1	:	108874	111542	104581	118674
1986Q1	:	116521	121685	116936	132186
1987Q1	:	128906	135980	127352	145630
1988Q1	:	143237	146475	138731	155911
1989Q1	:	153228	159918	149557	170041
1990Q1	:	169039	175427	165625	182577
1991Q1	:	186376	194995	183047	203407
1992Q1	:	193028	195125	185161	198951

C: Tot private consumption, mill. 1985-P

1969Q1	:	82922	90405	87252	99889
1970Q1	:	87157	93083	89742	103085
1971Q1	:	84626	93449	91262	104063
1972Q1	:	93082	96006	92496	104629
1973Q1	:	94009	98988	94956	108223
1974Q1	:	94390	103687	102370	109104
1975Q1	:	99394	105588	101493	114536
1976Q1	:	103900	109759	104990	119860
1977Q1	:	106162	109511	102043	116239
1978Q1	:	102806	107233	103205	117641
1979Q1	:	106513	111115	104119	119548
1980Q1	:	108993	108710	104972	113353
1981Q1	:	106741	109923	102824	114374
1982Q1	:	107581	109907	102996	115854
1983Q1	:	104538	106575	101038	113739
1984Q1	:	107069	108707	102041	114248
1985Q1	:	110465	111821	104456	116929
1986Q1	:	112643	116681	111467	124453
1987Q1	:	118824	124646	114762	129451
1988Q1	:	124931	126021	118040	131434
1989Q1	:	124682	128570	119581	134451
1990Q1	:	126550	129348	119686	130987
1991Q1	:	125662	129535	121000	134256
1992Q1	:	125024	126785	120384	128725

CNDL: nondurable cons. expend. (CL-CSODL-CARL), mill.

1969Q1	:	14853	15690	15812	16763
1970Q1	:	16441	17340	17292	18567
1971Q1	:	17796	18664	18883	20015
1972Q1	:	20027	20400	20560	21514
1973Q1	:	21497	22482	22572	23895
1974Q1	:	23805	24883	25228	26952
1975Q1	:	26849	28105	28492	30760
1976Q1	:	31185	32382	32687	35513
1977Q1	:	34901	35740	36348	39379
1978Q1	:	39753	40426	40501	43594
1979Q1	:	43801	44625	44314	48997
1980Q1	:	49614	49675	50070	53672
1981Q1	:	55564	57244	56438	60770
1982Q1	:	62508	63505	62505	67538
1983Q1	:	67966	68780	68505	73939
1984Q1	:	74988	75951	73921	79758
1985Q1	:	83624	83172	80848	86687
1986Q1	:	89088	89700	88582	93559
1987Q1	:	96066	97515	95480	101424
1988Q1	:	104517	104458	102723	108879
1989Q1	:	112342	115285	111709	119481
1990Q1	:	125210	129192	126999	133420
1991Q1	:	142437	146180	142718	149934
1992Q1	:	149688	151708	147846	152681

CND: nondurable cons. expend. (C-CSOD-CAR), mill. 1985-P

1969Q1	:	64467	67539	67269	71599
1970Q1	:	69033	71983	70723	76411
1971Q1	:	68675	72752	72175	76679
1972Q1	:	73418	74183	73216	77012
1973Q1	:	73250	75717	74456	78881
1974Q1	:	73426	76861	76414	80554
1975Q1	:	76635	78917	76958	81993
1976Q1	:	79008	80662	79721	85951
1977Q1	:	81222	80468	78332	84044
1978Q1	:	79515	80413	79460	85407
1979Q1	:	82314	83214	80043	87147
1980Q1	:	83171	81784	80394	83305
1981Q1	:	82128	82951	79668	83775
1982Q1	:	82313	82114	79687	83790
1983Q1	:	80685	80373	78572	83105
1984Q1	:	82013	81827	79240	83759
1985Q1	:	84698	83297	80635	85701
1986Q1	:	85510	85669	83936	88171
1987Q1	:	87929	88939	85139	89602
1988Q1	:	90405	89376	86316	90823
1989Q1	:	90066	91286	87535	92736
1990Q1	:	91241	92318	88581	92079
1991Q1	:	91391	92156	89599	93538
1992Q1	:	92056	93874	91309	92955

CSODL: Cons. expend. - Semi & Other durables, mill.

1969Q1	:	3856	4702	4139	6021
1970Q1	:	4171	5140	4570	6687
1971Q1	:	4204	5423	4990	7238
1972Q1	:	5239	6009	5300	7694
1973Q1	:	5779	6764	5907	8831
1974Q1	:	6634	8396	7989	10164
1975Q1	:	7743	9530	8774	12308
1976Q1	:	9237	11191	9843	13820
1977Q1	:	10256	12220	10633	15207
1978Q1	:	10937	12879	11529	16262
1979Q1	:	12138	14314	12621	17782
1980Q1	:	14461	15580	14427	18832
1981Q1	:	15478	17273	15105	20378
1982Q1	:	16783	18836	16130	22710
1983Q1	:	17906	20202	17706	24654
1984Q1	:	20472	22441	19448	26491
1985Q1	:	22233	24613	21489	28956
1986Q1	:	23877	27447	24751	33093
1987Q1	:	27771	30974	27178	36491
1988Q1	:	31618	33688	29840	39172
1989Q1	:	34408	37006	32608	43261
1990Q1	:	37876	40365	34814	44834
1991Q1	:	39581	42312	36173	47762
1992Q1	:	38231	37767	33997	42625

CSOD: Cons. expend. - Semi & Other durables, mill. 1985-P

1969Q1	:	15772	19201	16884	24307
1970Q1	:	15348	18745	16473	23600
1971Q1	:	13932	17929	16434	23437
1972Q1	:	16590	18751	16659	23871
1973Q1	:	17536	20270	17683	25976
1974Q1	:	18597	23207	21593	25748
1975Q1	:	19444	23330	21078	28737
1976Q1	:	21078	24828	21735	29554
1977Q1	:	21559	25106	21343	29602
1978Q1	:	20601	23677	21003	28954
1979Q1	:	21166	24397	21320	29203
1980Q1	:	22993	24340	22028	27441
1981Q1	:	22030	24310	20981	27567
1982Q1	:	22253	24473	20845	28214
1983Q1	:	21261	23312	20120	27102
1984Q1	:	22322	23971	20620	27323
1985Q1	:	22671	24696	21600	28324
1986Q1	:	23762	26807	24268	31499
1987Q1	:	26614	29428	25848	33823
1988Q1	:	29092	30387	27131	34831
1989Q1	:	30002	31931	28362	36669
1990Q1	:	31255	33059	28555	36055
1991Q1	:	31433	33155	28693	37100
1992Q1	:	29768	29395	26993	33523

Stock of semi & other durables, mill. 1985-P

$KCSOD=CSOD + (1-.0648)\cdot KCSOD_{-1}$, KCSOD[1969Q4]= 202635

CARL: Consumer expenditure on cars, mill.

1969Q1	:	606	828	700	911
1970Q1	:	767	662	717	872
1971Q1	:	571	783	751	1120
1972Q1	:	913	935	805	1151
1973Q1	:	1060	1020	964	1202
1974Q1	:	901	1349	1632	1173
1975Q1	:	1389	1425	1508	1709
1976Q1	:	1741	2023	1693	2097
1977Q1	:	1684	2020	1243	1434
1978Q1	:	1551	1846	1614	1956
1979Q1	:	1850	2165	1714	2052
1980Q1	:	1833	1701	1694	1771
1981Q1	:	1774	1853	1522	2153
1982Q1	:	2195	2449	1825	3052
1983Q1	:	2143	2474	2034	3133
1984Q1	:	2535	2709	2030	3031
1985Q1	:	3017	3757	2244	3031
1986Q1	:	3556	4538	3603	5534
1987Q1	:	5069	7491	4694	7715
1988Q1	:	7102	8329	6168	7860
1989Q1	:	6478	7627	5240	7299
1990Q1	:	5953	5870	3812	4323
1991Q1	:	4358	6503	4156	5711
1992Q1	:	5109	5650	3318	3645

CAR: Consumer expenditure on cars, mill. 1985-P

1969Q1	:	2683	3664	3099	3984
1970Q1	:	2776	2355	2546	3074
1971Q1	:	2019	2768	2652	3947
1972Q1	:	3074	3071	2621	3746
1973Q1	:	3223	3001	2817	3366
1974Q1	:	2367	3619	4364	2802
1975Q1	:	3316	3341	3457	3806
1976Q1	:	3813	4269	3534	4355
1977Q1	:	3382	3937	2368	2593
1978Q1	:	2690	3142	2742	3280
1979Q1	:	3032	3504	2756	3198
1980Q1	:	2829	2586	2550	2607
1981Q1	:	2583	2662	2175	3032
1982Q1	:	3015	3320	2464	3850
1983Q1	:	2592	2890	2346	3532
1984Q1	:	2734	2909	2181	3166
1985Q1	:	3096	3828	2221	2904
1986Q1	:	3371	4205	3263	4783
1987Q1	:	4281	6279	3775	6026
1988Q1	:	5434	6258	4593	5780
1989Q1	:	4614	5353	3684	5046
1990Q1	:	4054	3971	2550	2853
1991Q1	:	2838	4224	2708	3618
1992Q1	:	3200	3516	2082	2247

Car stock, mill. 1985-P:

$KCAR = CAR + (1-.0190) \cdot KCAR_{-1}$, KCAR[1969q4]= 100168

YL: Disposable income, mill.

1969Q1	:	20040	20907	22706	26098
1970Q1	:	20543	21865	23786	30938
1971Q1	:	22489	23008	26156	33125
1972Q1	:	24736	25341	27110	35835
1973Q1	:	27692	28700	30180	39885
1974Q1	:	31832	33965	35272	45256
1975Q1	:	35108	38092	41178	51942
1976Q1	:	41898	41362	46126	58422
1977Q1	:	46304	45166	50350	67456
1978Q1	:	52074	52605	55467	72984
1979Q1	:	57877	55616	60148	79793
1980Q1	:	64661	63336	70016	95075
1981Q1	:	69843	71072	73656	107510
1982Q1	:	75320	77350	77822	115263
1983Q1	:	84669	85492	86495	121917
1984Q1	:	92064	91164	95404	133949
1985Q1	:	99414	101738	103916	149066
1986Q1	:	109837	109316	116732	157862
1987Q1	:	116770	118665	123209	164344
1988Q1	:	121781	127069	131473	177038
1989Q1	:	135759	135440	144027	187962
1990Q1	:	146361	160652	159320	222524
1991Q1	:	177318	185375	189406	242981
1992Q1	:	180247	195085	203872	260831

WFL: Household Financial Wealth, mill.

1969Q1	:	na	na	na	103110
1970Q1	:	103595	101417	100807	100955
1971Q1	:	104996	105087	106984	110641
1972Q1	:	113214	111786	112302	112967
1973Q1	:	115533	112621	111811	111963
1974Q1	:	115855	113280	114786	117368
1975Q1	:	122875	121915	124162	128019
1976Q1	:	130818	127969	127183	126411
1977Q1	:	129017	122790	122414	121689
1978Q1	:	126914	123243	126362	128286
1979Q1	:	137506	131663	130416	135346
1980Q1	:	143138	133524	133833	146343
1981Q1	:	152187	150667	153429	180043
1982Q1	:	187833	183933	185347	201131
1983Q1	:	223814	225722	245489	268291
1984Q1	:	268531	266448	264321	263525
1985Q1	:	294117	294117	285697	350234
1986Q1	:	461326	480140	479048	482503
1987Q1	:	485050	475098	466055	464484
1988Q1	:	483901	502469	521267	545085
1989Q1	:	663238	636881	616055	610111
1990Q1	:	567051	525831	483329	491889
1991Q1	:	572004	571624	544414	541110
1992Q1	:	553455	512249	450103	564831

KH: Stock of private homes, mill. 1985-P
Sum: stock of primary and second homes.

1969Q1	:	na	na	na	495000
1970Q1	:	498197	502207	506500	510451
1971Q1	:	513351	516977	521042	525295
1972Q1	:	529219	533834	538878	544223
1973Q1	:	549420	555187	560740	566425
1974Q1	:	571861	578094	583881	589799
1975Q1	:	596155	602562	607883	613083
1976Q1	:	617832	624049	629984	635612
1977Q1	:	640503	646148	651325	656790
1978Q1	:	662092	668086	673833	679564
1979Q1	:	684618	690395	696104	701449
1980Q1	:	705667	710347	714865	719004
1981Q1	:	722119	725516	728763	731552
1982Q1	:	733536	735823	738044	740162
1983Q1	:	741660	743429	744960	746172
1984Q1	:	746875	748029	749251	750714
1985Q1	:	752101	753149	753886	754780
1986Q1	:	755002	756118	756846	757905
1987Q1	:	758306	759747	761036	762329
1988Q1	:	763533	765853	768146	770316
1989Q1	:	772140	775118	777868	780142
1990Q1	:	782280	785910	789434	792869
1991Q1	:	795369	798030	800219	801866
1992Q1	:	802534	803683	804140	804164

PH: Market price index for private homes, 1985=1
Weighted mean of fastighetsprisindex egnahem, fritidshus.

1969Q1	:	0.3190	0.3280	0.3280	0.3278
1970Q1	:	0.3357	0.3356	0.3356	0.3447
1971Q1	:	0.3448	0.3537	0.3536	0.3628
1972Q1	:	0.3719	0.3809	0.3809	0.3900
1973Q1	:	0.3992	0.4082	0.4081	0.4173
1974Q1	:	0.4265	0.4354	0.4457	0.4730
1975Q1	:	0.4913	0.5185	0.5365	0.5560
1976Q1	:	0.5743	0.6051	0.6389	0.6402
1977Q1	:	0.6663	0.7051	0.7244	0.7427
1978Q1	:	0.7494	0.7984	0.8360	0.8348
1979Q1	:	0.8439	0.8893	0.9219	0.9153
1980Q1	:	0.9051	0.9203	0.9335	0.9075
1981Q1	:	0.9130	0.9203	0.9100	0.8894
1982Q1	:	0.8997	0.9227	0.9306	0.9203
1983Q1	:	0.9137	0.9252	0.9264	0.9343
1984Q1	:	0.9331	0.9627	0.9718	0.9730
1985Q1	:	0.9821	1.0070	1.0094	1.0015
1986Q1	:	1.0173	1.0403	1.0639	1.0948
1987Q1	:	1.1342	1.1699	1.2039	1.2481
1988Q1	:	1.3093	1.3687	1.4517	1.4820
1989Q1	:	1.5680	1.6492	1.7140	1.7158
1990Q1	:	1.8231	1.8582	1.9019	1.8612
1991Q1	:	2.0188	2.0182	2.0224	2.0077
1992Q1	:	1.9035	1.8684	1.8186	1.6968

rs: Short interest rate.
From A. Markowski's Minimac model extended forward using treasury bills (ssvx); backward (1969q1-70q3) =3-month Tbill (Riksbank) + 1.5 %-point (mean abs diff 70q4-71q4)

1969Q1	:	0.0722	0.0797	0.0939	0.0947
1970Q1	:	0.0997	0.0997	0.0997	0.0938
1971Q1	:	0.0882	0.0732	0.0722	0.0634
1972Q1	:	0.0617	0.0618	0.0619	0.0620
1973Q1	:	0.0621	0.0622	0.0621	0.0620
1974Q1	:	0.0639	0.0758	0.0822	0.0883
1975Q1	:	0.0885	0.0888	0.0859	0.0773
1976Q1	:	0.0717	0.0720	0.0886	0.1080
1977Q1	:	0.1083	0.1079	0.1127	0.1160
1978Q1	:	0.1054	0.0927	0.0802	0.0799
1979Q1	:	0.0809	0.0812	0.0951	0.1117
1980Q1	:	0.1305	0.1264	0.1270	0.1321
1981Q1	:	0.1548	0.1492	0.1305	0.1223
1982Q1	:	0.1234	0.1303	0.1436	0.1327
1983Q1	:	0.1113	0.1098	0.1145	0.1215
1984Q1	:	0.1100	0.1114	0.1350	0.1208
1985Q1	:	0.1306	0.1513	0.1513	0.1337
1986Q1	:	0.1131	0.1008	0.0918	0.0876
1987Q1	:	0.1029	0.0917	0.0893	0.0917
1988Q1	:	0.0925	0.1011	0.1044	0.1052
1989Q1	:	0.1079	0.1154	0.1169	0.1120
1990Q1	:	0.1406	0.1309	0.1288	0.1464
1991Q1	:	0.1250	0.1154	0.1050	0.1181
1992Q1	:	0.1214	0.1170	0.1510	0.1247

rl: Long gov't interest rate (10yrs, recently 5yr), mean of months from Allmän månadsstatistik.

1969Q1	:	0.0642	0.0693	0.0728	0.0727
1970Q1	:	0.0728	0.0734	0.0750	0.0744
1971Q1	:	0.0729	0.0729	0.0723	0.0712
1972Q1	:	0.0723	0.0727	0.0732	0.0735
1973Q1	:	0.0736	0.0739	0.0741	0.0739
1974Q1	:	0.0724	0.0781	0.0795	0.0815
1975Q1	:	0.0818	0.0875	0.0908	0.0914
1976Q1	:	0.0914	0.0915	0.0921	0.0977
1977Q1	:	0.0964	0.0974	0.0976	0.0983
1978Q1	:	0.0994	0.1023	0.1013	0.1007
1979Q1	:	0.1013	0.1020	0.1045	0.1109
1980Q1	:	0.1114	0.1134	0.1182	0.1267
1981Q1	:	0.1323	0.1356	0.1372	0.1344
1982Q1	:	0.1279	0.1287	0.1323	0.1328
1983Q1	:	0.1281	0.1218	0.1196	0.1225
1984Q1	:	0.1197	0.1168	0.1261	0.1286
1985Q1	:	0.1287	0.1334	0.1312	0.1277
1986Q1	:	0.1166	0.0990	0.0963	0.0986
1987Q1	:	0.1124	0.1133	0.1169	0.1151
1988Q1	:	0.1121	0.1116	0.1129	0.1112
1989Q1	:	0.1072	0.1114	0.1117	0.1218
1990Q1	:	0.1398	0.1358	0.1347	0.1326
1991Q1	:	0.1165	0.1106	0.1063	0.1027
1992Q1	:	0.0976	0.0997	0.1113	0.1069

MTR: Marg tax rate on interest deductions leading 1 year ahead. Assumed 50% throughout 1980s until tax reform of 90s. Interpolative guess-link to SCB Income & Wealth distribution figures 1975-80. Linked to Anders Forslund's estimates for industry worker pre-1975. Annual: Repeat for all quarters, half-years in the each year.

1969	:	0.45	0.42	0.44	0.45	0.46
1974	:	0.56	0.58	0.57	0.57	0.57
1979	:	0.56	0.50	0.50	0.50	0.50
1984	:	0.50	0.50	0.50	0.50	0.50
1989	:	0.40	0.30	0.30	0.30	0.30

DVAT: VAT CHANGE. PRICE expost/exante assuming full shift forward. P'/P=1+v= (1-vat[-1]/100)/(1-vat/100); vat(%) from Näringslivets Ekonomifakta, estimate 1992.

1970Q1	:	1.00	1.00	1.00	1.00
1971Q1	:	1.06	1.00	1.00	1.00
1972Q1	:	1.00	1.00	1.00	1.00
1973Q1	:	1.00	1.00	1.00	1.00
1974Q1	:	1.00	0.97	1.01	1.03
1975Q1	:	1.00	1.00	1.00	1.00
1976Q1	:	1.00	1.00	1.00	1.00
1977Q1	:	1.00	1.00	1.03	1.00
1978Q1	:	1.00	1.00	1.00	1.00
1979Q1	:	1.00	1.00	1.00	1.00
1980Q1	:	1.00	1.00	1.00	1.02
1981Q1	:	1.00	1.00	1.00	0.99
1982Q1	:	1.00	1.00	1.00	1.00
1983Q1	:	1.01	1.00	1.00	1.00
1984Q1	:	1.00	1.00	1.00	1.00
1985Q1	:	1.00	1.00	1.00	1.00
1986Q1	:	1.00	1.00	1.00	1.00
1987Q1	:	1.00	1.00	1.00	1.00
1988Q1	:	1.00	1.00	1.00	1.00
1989Q1	:	1.00	1.00	1.00	1.00
1990Q1	:	1.00	1.00	1.01	1.00
1991Q1	:	1.00	1.00	1.00	1.00
1992Q1	:	1.07	1.00	1.00	1.00

SAMMANFATTNING

Studien undersöker den privata konsumtionens bestämningsfaktorer genom regressionsskattningar av konsumtionsfunktioner på kvartals- respektive halvårsdata 1970-1992. Skattningarna avser både totala och icke-varaktiga konsumtionsutgifter samt köp av bilar respektive övriga varaktiga varor.

Analysen baseras på en sk error-korrektionsmodell, vilken karakteriserar konsumtionens årliga förändring som en i huvudsak fördröjd anpassning till en långsiktig jämviktsbana. Banans utveckling styrs av disponibel inkomst, finansiell nettoförmögenhet, hustillgångar, den långa räntan efter marginalskatt samt inflationstakten. Hustillgångarna uppdelas i komponenterna husstock och fastighetspris. Långsiktsbanan för varaktiga varor avser stockens utveckling, medan utgifterna i anpassingen behandlas som investeringar. Anpassningen påverkas också av tillfälliga faktorer i inkomst- och förmögenhets-tillväxten (kapitalvinster, -förlustar), förändringar i inflationstakten, momsändringar samt gapet mellan den korta och långa räntan efter skatt.

Huvudsyftet med studien är att bedöma i vilken mån de nämnda faktorerna har effekter på konsumtionen - och därmed på nettosparkvoten - i linje med en teoretiskt syn och populära föreställingar beträffande utvecklingen under det senaste decenniet. Resultaten är av värde som underlag vid KI:s löpande konjunkturbedömningar samt vid vidareutvecklingen av dess ekonomimodell (KOSMOS) för Sverige. Skattningsresultaten är konsistenta med teoretiska och populära uppfattningar bl.a. beträffande kapitalvinsternas bidrag (aktier, småhuspriser) till den sk "konsumtionsfesten" under senare delen av 80-talet, om räntans betydelse m.m. Detta gäller i synnerhet utgifter för varaktiga varor, vars instabila och investerings-cykliska förlopp präglar konsumtionsutvecklingen i stort.

Funktionerna för varaktiga varor, liksom investeringsfunktioner i allmänhet, har dock flera brister.

Något överraskande finnas stock-komponenten i hustillgångarna bidra till konsumtionstillväxt med en stor effekt vid sidan om dess roll som komponent i hustillgångarna. Detta tolkas så, att sparandet (för husköp) minskar när bostadsbristen är mindre, dvs. när stocken är större. Alternativt kan hustockens utveckling tänkas spegla en svårmätbar utelämnad förklaringsvariabel, nämligen expansionen i de sociala trygghetssystemen, vilken kan ha substituterat för långsiktigt eget sparande. Inte heller har arbetslöshetens innebörd undersökts eller hushållens förväntningar (enligt enkätdata) förts in i analysen. Dessa aspekter utgör föremål för en fördjupad studie.

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