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The Swedish Boom to Bust Cycle: Tax Reform, Consumption and Asset Structure

Jonas Agell, Lennart Berg and Per-Anders Edin*

Summary

■ A variety of approaches are tried out in order to examine three questions. How did the major Swedish tax reform of 1991, which implied lower tax rates and a sharp increase in real after-tax borrowing rates, affect aggregate consumption? How did the tax reform affect household savings composition? To what extent did the portfolio adjustments differ across taxpayers? Our main conclusions are as follows. Although the tax reform coincided with the exceptional consumption bust of the early 1990s, tax factors most likely played a minor role. To the extent that the tax reform mattered, capitalisation effects in the housing market is the most plausible mechanism. However, on the asset side there was a strong incentive to shift from non-financial to financial savings outlets, and aggregate data suggest that households responded to these incentives. Our microeconomic evidence, building on survey data on the asset holdings of individual households, indicates somewhat surprisingly that most tax clientele effects had already vanished prior to the tax reform. ■

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The Swedish Boom to Bust Cycle: Tax Reform, Consumption and Asset Structure

Jonas Agell, Lennart Berg and Per-Anders Edin*

In this paper we try to answer three questions. How did the Swedish tax reform of 1991 affect aggregate consumption? How did the tax reform affect the composition of household savings? To what extent did the portfolio adjustments differ across taxpayers? Our main conclusions are as follows.

Aggregate consumption in Sweden has evolved in a very erratic manner in recent years. The consumption boom of the mid to late 1980s was followed by the consumption bust of the early 1990s. Although the sharp spending reversal coincided with the tax reform, we believe that other factors (discussed at length in subsequent sections) are more likely culprits. While the tax reform certainly served to increase real after tax interest rates, the macroeconomic data strongly suggest that the interest sensitivity of consumption is small. After experimenting with a structural Euler equation approach, we find it hard to avoid the conclusion that the intertemporal elasticity of substitution in consumption is close to zero. The absence of significant interest rate effects also comes through when we estimate a more traditional, "solved-out", consumption function. As a consequence, it is very hard to make the case that the consumption bust merely reflects postponed consumption due to higher after tax interest rates. Instead, the main channel for a tax induced consumption response seems to be indirect wealth effects stemming from tax induced capitalisation effects in asset markets in general, and the market for owner-occupied housing in particular.

* *We are indebted to Nils Gottfries for insightful comments and criticism.*

Our prior was that the composition of household savings was an area where the tax reform ought to matter, and we find no evidence that makes us revise our beliefs. As the tax reform implied an increase in the net cost of borrowing, and there was much less scope for a number of debt financed arbitrage operations, households were given strong incentives to reduce their liabilities. On the asset side, there was an incentive to switch from non-financial to financial savings outlets. Our aggregate data suggest that households responded to these incentives. The recent dramatic increase in the ratio of financial savings to savings in real assets, like housing and durables, is highly correlated with observed changes in taxes and relative rates of return.

The microeconomic evidence is more to our embarrassment. Our prior was that the asymmetries of the old tax system created substantial tax clientele effects, in the sense that individuals specialised in assets according to their tax brackets. We also anticipated that the tax reform (which had the explicit purpose of eliminating tax shelters) would have the strongest effect on the portfolio choice of individuals in the highest pre-reform tax brackets. However, after examining a succession of cross sections on the asset holdings of households since 1979, we conclude that much of the tax clientele effects gradually dissolved during the late 1980s (i.e. before the tax reform). Another result is that we find no indication of asymmetric responses to the tax reform in a panel of taxpayers. Individuals in different pre-reform tax brackets have adjusted their portfolios in a fairly uniform manner. One explanation for these rather surprising results could be that the tax reform efforts of the early and mid 1980s in fact contained features that removed many tax clientele effects.

While we are confident about the qualitative nature of our results, we are in no position to make bold claims about the quantitative magnitudes involved. The paper is filled with point estimates and other computer output, but we do not in any way want to give the impression that they represent the last word. From an econometrician's point of view, the timing of the tax reform is unfortunate. In 1991 the Swedish economy was headed towards its deepest recession since the 1930s. In the fourth quarter of 1989, open unemployment was 1.4 percent; four years later it stood at 8.3 percent. Equally dramatic changes can be seen in other time series, including inflation, investment, the public sector deficit, asset prices and interest rates. In such an environment, where the influence of the tax reform is confounded by large macroeconomic shocks, it is difficult to identify structural tax effects with much precision.

The problem of inference is compounded by the fact that the policy environment has been rather unstable since the implementation of the tax reform. In 1992 the government announced that it would phase out the progressive wealth tax. In 1993 the dividend tax was abolished, the tax on capital gains on common shares was cut in half, and owners of new enterprises were allowed to deduct losses against ordinary labour income. In 1994 tax policy took a twist in the other direction, and most of the basic provisions of the tax reform act were reinstated. As a consequence, much of the action that we see in the data may reflect anticipations of future tax changes and policy uncertainty rather than the tax reform act *per se*.

We believe that there is no single correct way of analysing consumption and portfolio choice. In the following we thus adopt a rather eclectic approach, which involves documenting some stylised facts, trying out different econometric approaches, and exploiting the information in both macro- and microeconomic data. Sections 1 and 2 set the stage for our analysis by documenting recent trends in tax incentives, consumption, and savings composition. Section 1 reports calculations on the effective tax rates on different assets before and after the tax reform. We also present evidence on the magnitude of the gains from one popular vehicle for tax arbitrage, namely individual retirement accounts. We conclude that the tax reform implied a relatively large step in the direction of levelling the playing field and reducing tax arbitrage. In Section 2 we discuss some conceptual issues involved in measuring savings, and conclude that consumption is a more reliable left-hand side regression variable. We also take a preliminary look at the development of some of the potential right-hand side variables.

The next sections turn to the econometric evidence. In Section 3 we re-examine the interest sensitivity of aggregate consumption growth using a structural Euler equation approach. The implied estimates for the intertemporal elasticity of substitution in consumption are typically never even close to being significant with the positive sign predicted by theory. We also take another look at the excess sensitivity puzzle of consumption, and conclude that aggregate Swedish data is broadly consistent with a model where between 10 and 20 percent of disposable income accrues to "rule of thumb", or liquidity constrained, consumers. Section 4 contains evidence based on a traditional "solved out" consumption function, which in an approximate way incorporates a variety of theoretical features. Again, we find a role for liquidity constraints, but also for uncer-

tainty and asset prices. In many of our specifications we find that asset prices have an independent effect on consumption. We argue that these wealth and price effects are the most natural way of linking the behaviour of aggregate consumption to the tax reform. We also report a number of stability tests; less surprisingly we find that our models have a hard time tracking the extraordinary consumption bust in 1992–93.

Section 5 turns to the aggregate evidence on the effects of taxes on the composition of savings between financial and non-financial assets. We try out a variety of simple financial savings equations, and find that relative returns and taxes have explanatory power. Section 6 addresses the micro-economic evidence on tax clientele effects. We review and update previous cross-section work in the area; we also exploit the information in a panel containing information on households' asset holdings before and after the tax reform. Section 7 concludes.

1. The tax reform: levelling the playing field and reducing tax arbitrage

The tax reform implied far-reaching changes in the taxation of capital income. Income tax bases were broadened, and marginal tax rates on personal and corporate income were cut. Before the tax reform the progressive income tax schedule applied to all sources of personal income, i.e. the tax system adhered to the principle of *global* income taxation; cf. Sørensen (1994). After the reform Sweden adheres to the principle of *dual* income taxation. Although a progressive rate schedule still applies to labour income (with a basic marginal tax rate of 30 percent, and a top marginal tax rate of 50 percent), all kinds of personal capital income are now taxed at a flat rate of 30 percent.

Before the tax reform act of 1991 most observers agreed that the taxation of capital income had two major shortcomings. First, as the tax system treated the returns on different assets in a non-uniform manner, especially in times of inflation, it was feared that savings were channelled to the wrong kinds of investments. Second, the old system permitted a number of straightforward tax arbitrage operations, which undermined the tax base and stimulated borrowing. Let us discuss each issue in turn.

Table 1 shows the required real rate of return before tax on a marginal investment in four assets in order for a household investor to receive a

Table 1. Real required rate of return before tax (in percent) when the real return after tax is two percent

	Old tax system (1985) Inflation (in percent)			1991 tax system Inflation (in percent)		
	0	5	10	0	5	10
Corporate shares	4.1	9.8	15.0	2.9	4.8	6.8
Own homes	3.7	3.7	4.3	2.9	3.4	3.4
Bank savings	5.0	12.5	20.0	2.9	5.0	7.1
Consumer durables	2.0	2.0	2.0	2.0	2.0	2.0

Source: Calculations provided by Jan Södersten. For a documentation of the underlying cost-of-capital models, see Södersten (1993).

real rate of return of two percent after all taxes. We assume that all investments are fully equity financed; i.e., we disregard leverage effects. In the pre-reform case, which corresponds to the tax rules in 1985, we assume that the marginal tax rate, applying to both labour and capital income, of our household investor is 60 percent. In the post-reform calculations, we set the marginal tax rate, which now only applies to non-labour income, at 30 percent.

The first row, columns 1–3, gives the cost of capital in the *corporate sector* under the old tax system. The figures are based on a conventional cost-of-capital calculation, under the assumptions that the source of finance is 50 percent new issues and 50 percent retained earnings, and that the investment is a "sandwich" of machinery, buildings and inventories. As we consider a household owner, the tax wedge depends on the interaction between the corporate profits tax and the personal tax on dividends and capital gains. At the corporate level, the effective tax rate hinges in a complicated manner on various tax allowances, including accelerated depreciation and allocations to the investment fund system.

Under the old tax system the marginal tax wedge on investments in *owner-occupied housing* depended on the tax on imputed housing income (two percent of the tax-assessed value of the house was added to the income tax base of the owner), and on the property tax (introduced in 1985), which amounted to 1.4 percent of one third of the tax assessed value. Also, real capital gains on housing were taxed upon realisation, subject to some minor restrictions on the extent of indexation of the acquisition cost. Households' income from *interest bearing assets* ("bank savings") was, without modification, added to the tax base. At zero per cent inflation the real pre-tax interest rate required to yield a two percent

real rate of return after tax was then five percent, implying a tax wedge of three percentage points.

The inter-asset tax distortions created in the old system seem fairly modest when the inflation rate was low. However, since both the personal and corporate tax codes almost exclusively relied on nominal income concepts, higher inflation radically changes the picture. At an inflation rate of ten percent, the dispersion of tax wedges is very large. The combination of double digit inflation and nominal interest taxation implies that the required real rate of return on bank savings was 20 percent, i.e. the tax wedge increases to 18 percentage points. The almost as dramatic increase in the cost of capital in the corporate sector reflects the combination of historical cost depreciation, first-in-first-out inventory valuation, and taxation of nominal capital gains. The inflation sensitivity of the marginal tax wedge on owner-occupied housing, due to the incomplete indexation of housing capital gains, was much less pronounced.

In short, the old tax system was extremely sensitive to inflation. As the average inflation rate in the 1980s was eight percent (as measured by the GDP deflator), there was at least in theory a motive for shifting savings from corporate assets and interest-bearing assets to durables and housing. In the Swedish policy debate during the 1980s, this possibility caused much concern, and it was feared that discrimination of household financial savings led to underinvestment in the corporate sector, and overinvestment in housing and durables.[1]

Turning to the new tax system, two main features stand out: lower statutory tax rates, and a broadening of the tax base, particularly on the corporate side. As is seen from the table, the tax reform act of 1991 did imply a large step in the direction of levelling the playing field. The inflation sensitivity of the tax system is much reduced, and the difference in the tax treatment of investments in corporate assets and housing seems minor. We may also note that this development has occurred in spite of

[1] While we believe that there is some truth in this, we should note that some forces, not accounted for in table 1, operated in the opposite direction. First, as Sweden removed most of her foreign exchange controls during the 1980s, many firms (perhaps especially medium to large ones) were no longer confined to raise capital domestically. Second, much of the financial resources that went to the corporate sector were channelled through various financial intermediaries (e.g. tax exempt institutions and insurance companies), which were subject to a preferential tax treatment; see Södersten (1993) for further discussion. Third, to the extent that preferential tax treatment of housing gets capitalised in house prices and aggregate net wealth, the conventional assumption that asset demands are homogeneous of degree one in net wealth implies the existence of positive spillover effects in the markets for corporate assets; see Agell (1989).

the fact that the new tax system, unlike the old one, is based exclusively on nominal income concepts. Thus, while inflation still distorts the measurement of taxable capital income, the reduced statutory tax rates cushion the marginal incentive effect of higher inflation. The new tax system, in conjunction with the fact that Sweden underwent a disinflationary period in the early 1990s, suggests that households were given a strong incentive to shift from real to financial savings outlets. As we will see below, households seem to have adjusted accordingly.

A second major impetus for the reform was the multitude of tax avoidance operations available under the old system. While often quite complicated in appearance, many of these operations relied on the simple idea of generating a net taxable income loss by purchasing lowly taxed assets with borrowed money, and deducting the interest expenses. The main obstacle in implementing this scheme was the fact that preferential tax treatment of assets in inelastic supply is capitalised in asset prices. In equilibrium the gain from tax arbitrage tends to be driven to zero. However, works of art and downtown flats were not the only tax shelters available in the 1980s. Let us consider the case of private pension savings in some detail.

Since the early 1950s, Swedish tax law has classified private life insurance policies as either private pension (annuity) plans, or capital insurance (endowment) plans. For our purpose, the former category is the most interesting one, as savings in a private pension plan certainly qualify as a low-taxed asset in quite elastic supply. Contributions to a plan were deductible against the personal income tax up to a certain ceiling, and the resulting pensions were, and still are, taxed as earned income when paid out. Thus, a consumption tax treatment applied. Before the tax reform the yearly return on private pension plans was untaxed. After the reform insurance companies pay a return tax of 15 percent (i.e. a rate well below the 30 percent rate on personal capital income).

Let us see how savings in a private pension plan interact with private borrowing. At time zero a household investor borrows one krona, and allocates the proceeds to a pension plan. Due to the tax deductability of pension savings, there is an immediate gain corresponding to m, the marginal tax rate of the investor. We assume that time is continuous. To highlight the scope for tax arbitrage, we disregard risk and assume that the nominal borrowing rate r is the same as the instantaneous nominal return on the pension plan. The tax rate, if any, on the latter return is f.

The investor finances all interest costs during the holding period by incurring new debt at the instantaneous rate $r(1-\tau)$, where τ is the constant tax rate at which interest costs are deductible. At time T our individual receives her pension as a one-shot lump sum, $exp(r(1-f)T)$, taxable at rate m, and pays back accumulated debt, $exp(r(1-\tau)T)$. After discounting back to time zero at the nominal rate $r(1-\tau)$, the net present value of this asset *cum* borrowing strategy becomes

$$NPV = m+\{(1-m)e^{r(1-f)T}-e^{r(1-\tau)T}\}e^{-r(1-\tau)T} \equiv (1-m)\{e^{(\tau-f)rT}-1\} \quad (1)$$

where we assume that m is constant over the investment horizon. In the absence of taxes, it follows readily that the net present value is zero. Thus, tax asymmetries are the only reason for a positive *NPV*. Note also that the size of *NPV* depends crucially on the accumulated net return factor $(\tau-f)rT$; for a given m, *NPV* increases with the difference between τ and f, and with the product of r and the holding period T.

Using (1) it is easy to provide some illustrative calculations on the size of the tax arbitrage gain before and after the tax reform. With the tax rules applying in the early 1980s, the return tax on insurance companies was zero ($f = 0$), and interest expenses were deductible at the same rate as the marginal tax rate on earned income ($m = \tau$). As a consequence, individuals with a high marginal tax rate could create a considerable leverage effect. With an interest rate of ten percent, a holding period of 30 years (which suggests that our hypothetical investor is in her early thirties) and a marginal tax rate of 75 percent, *NPV* becomes 2.12; i.e. the net present value is more than twice as large as the original investment outlay! With a holding period of 15 years, *NPV* becomes .52.

After the 1991 tax reform, the top marginal tax rate is 50 percent, which applies for most white collar workers who work full time. As the uniform rate of tax on personal capital income is 30 percent ($\tau = .3$), the leverage gains are correspondingly reduced. In conjunction with the new tax on private pension funds ($f = .15$), this implies that the accumulated net return factor is much smaller under the new tax code, and that the gains from tax arbitrage are much more modest. At an interest rate of ten percent, and a holding period of 30 years, an investor with a 50 percent marginal tax rate will now make a present value gain of 28 percent of the investment outlay. When the holding period is 15 years, *NPV* is .13.

The narrowing of loopholes in the tax system was not confined to private pension savings. Before the tax reform, realised capital gains on cor-

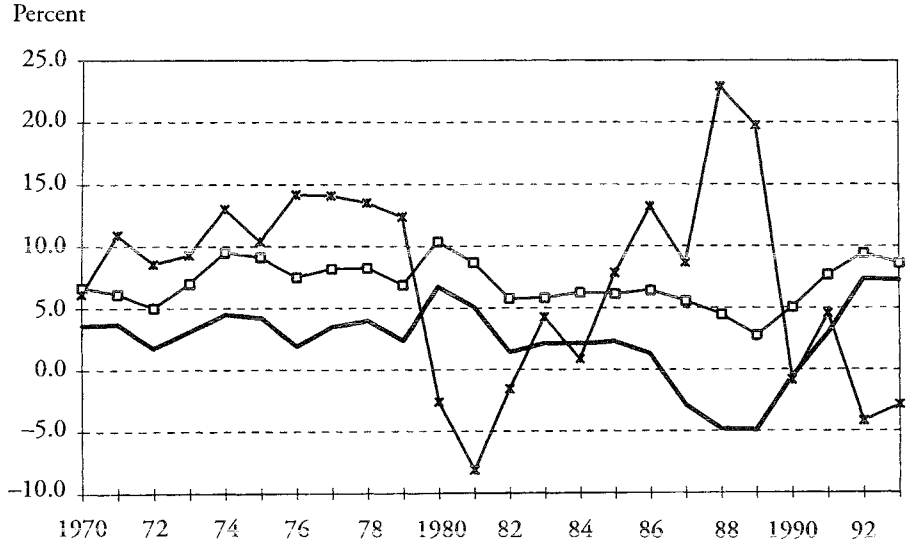
porate shares held for more than two years were taxed at a lower rate, while realised gains (losses) on assets held for less than two years were taxed (deductible) at the higher statutory rate. By holding a leveraged portfolio of corporate shares, an investor could lower his tax burden by deducting nominal interest expenses and simultaneously realising long-term capital gains and short-term losses. Also, the new flat tax rate on capital income implies that there is much less scope for simple tax planning within the family. When the progressive rate schedule applied to all personal income, taxes could be reduced by transferring assets to children or between spouses. On balance, there is every reason to believe that the tax reform act of 1991 did much to reduce the arbitrage sensitivity of the tax system, and to lower the incentive to inflate balance sheets by purchasing assets with borrowed money. On the behavioural side, we thus expect to see an overall shrinking of households' balance sheets, with smaller stocks of assets and debts.

2. Measurement problems and stylised facts

As shown in Figure 1 the 1980s and early 1990s witnessed dramatic changes in the conventionally measured savings rate of Swedish households. According to the National Accounts (NA) of Statistics Sweden, the savings rate was fairly stable during the 1970s, hovering around 3 percent. During the second half of the 1980s, savings decreased substantially, reaching a historical low of minus five percent in 1988–89. This trend was completely reversed during the early 1990s. Between 1989 and 1992 the savings rate increased by almost 13 percentage points. Indeed, to find a savings rate as high as the current one (eight percent), we have to go back to the early 1950s!

The dramatic development of the NA savings rate has led to much speculation in the popular debate. However, before jumping to rash conclusions about the likely causes, we should note that the conventional definition of household savings is incomplete. While it includes direct household financial savings and net investments in owner-occupied housing and holiday homes, it ignores net investments in consumer durables, as well as the contributions to a vast array of retirement plans, administered by the government and various labour market organisations. Figure 1 also describes an alternative savings series ("adjusted household savings"), where we have added net investments in consumer durables and contributions to

Figure 1. The household savings ratio according to three alternative definitions



— Savings ratio (NA) –□– Savings ratio adjusted –x– Savings ratio incl cap gains

NA-Savings ratio: By definition, according to the National Accounts, *household savings* is the sum of *net accumulation of financial assets* and *investments in tangible assets.* The former, net financial saving, consists mainly of borrowing and lending in the credit market, shares, individual insurance savings and savings in other interest bearing assets. The latter, net tangible saving, consists mainly of net investments in owner occupied homes and holiday homes. The National Accounts data we used for the household sector cover *households including private unincorporated enterprises and non-profit organisations serving households.*

Adjusted savings ratio: In the adjusted savings ratio, households' net investments in durable goods and savings in supplementary or collective pension schemes for white- and blue-collar workers are, in principle, included. We define a measure of pure consumption (expenditures for services and non-durable goods plus the value of services generated from the stock of durables owned by households) and adjust household disposable income (NA) by adding imputed durables income and savings in supplementary pension schemes (in the National Accounts, savings in supplementary pension schemes are registered in the sector "financial institutions"). Subtracting pure consumption from adjusted income gives us adjusted savings. The variables, on an annual basis, were developed from the Berg (1988) data set, and on a quarterly basis from the Berg (1990) data set.

Adjusted savings ratio including capital gains: Households' accrued capital gains, in real terms, on housing and shares were computed for 1970–93. The capital gains were then added to the adjusted savings ratio and adjusted disposable income.

retirement plans (supplementary pension schemes) administered by the trade unions and the employers' federations. Clearly, our more broadly defined savings ratio exhibits much less volatility over time. Although the trend reversal in the late 1980s and early 1990s still stands out, the magnitudes involved are much more modest: our extended savings ratio increased by six percentage points between 1989 and 1992.

According to the well-known definitions of Haig and Simons, both economic income (i.e. the consumption level that is consistent with unchanged real wealth) and savings (the period-to-period change in real wealth) are measured inclusive of real capital gains on non-human wealth. The third savings rate in the figure ("adjusted household savings including capital gains") is a very close relative of the Haig–Simons savings ratio; basically, we have added accrued real capital gains on owner-occupied housing and common shares to both the numerator and denominator of "adjusted household savings". The resulting savings rate obviously has very little in common with our other, more conventional, savings definitions – the simple correlation between the official savings ratio and the one adjusted for capital gains is –0.59.

A basic lesson from this simple definitional exercise is that there are many conceptual problems involved in measuring household savings. As a consequence, it is not very meaningful to select some arbitrary savings series to examine an issue like the "interest sensitivity of savings", as the result will depend crucially on the choice of savings concept. To explore how tax incentives affect aggregate behaviour we need a more robust measure of intertemporal adjustment. As we will see shortly, it makes more sense to study household consumption.

Although the development of the overall household savings rate is a matter open to dispute, the evidence is more clear-cut when it comes to the composition of savings. Table 2 shows the decomposition of the three savings series of Figure 1. In the last decade, the relation between household net lending and net investments in durables and tangible assets (primarily owner-occupied housing and holiday homes) has changed considerably. The sharp downturn of the NA savings rate in the late 1980s reflects to a large extent a shift from financial to non-financial savings. In the early 1990s, financial savings went in the opposite direction, and net investments in tangibles and durables came to a standstill. This composition effect is certainly what we would expect from the changes in tax incentives documented in the preceding section. We return to the link between taxes and savings composition in section 5.

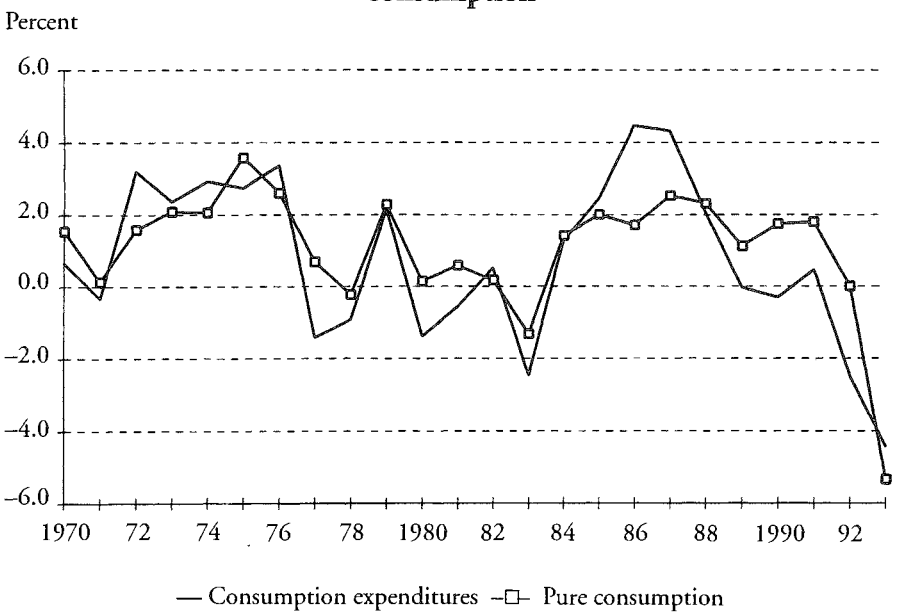
Table 2. Household savings composition according to three definitions

	1971–75	1976–80	1981–85	1986–89	1990–93
Household savings (NA)					
1. Financial assets	10.8	10.6	10.5	12.3	5.6
2. Liabilities	−11.6	−11.5	−9.8	−16.2	−0.9
3. Net lending (1+2)	−0.8	−0.8	0.7	−3.9	4.7
4. Net tangible assets	4.3	4.5	1.9	1.1	−0.5
5. Net savings 1 (3+4)	3.5	3.7	2.6	−2.8	4.3
Adjusted household savings					
1′. Savings in supplementary pension schemes	1.2	2.4	3.1	3.5	2.8
2′. Net lending	−0.8	−0.8	0.7	−3.6	4.3
3′. Net tangible assets	4.1	4.3	1.7	1.0	−0.4
4′. Net investment in durables	2.9	2.3	1.0	3.9	1.0
5′. Net savings 2 (1′+2′+3′+4′)	7.4	8.3	6.6	4.8	7.7
Adjusted household savings including capital gains					
1″. Savings in supplementary pension schemes	1.2	2.4	3.3	3.1	3.1
2″. Net lending	−0.7	−0.7	0.7	−3.1	4.9
3″. Net tangible assets	4.0	4.2	1.9	0.9	−0.5
4″. Net investment in durables	2.8	2.2	1.1	3.4	1.0
5″. Accrued capital gains	3.3	2.1	−6.4	11.8	−9.3
6″. Net savings 3 (1″+2″+3″+4″+5″)	10.5	10.3	0.7	16.1	−0.8

Source: National Accounts, Statistics Sweden, and own calculations. All figures are given in percent of disposable income, where the latter is measured in a way consistent with the relevant savings definition (for example, the income concept used when calculating the "adjusted household savings" ratio includes the income allocated to supplementary pension schemes).

The table also shows that the period 1986–89 was marked by a dramatic increase in borrowing. The implication for the aggregate financial balance sheet of the household sector, however, depends very much on the broadness of our definition of savings. According to the NA definition, the average net lending rate for the period was −3.9 percent. However, according to our first adjusted definition, negative net lending was just about matched by the savings in supplementary pension schemes. The popular claim that the second half of the 1980s was characterised by excessive growth in household indebtedness is correct only if one adopts a narrow view on the items that ought to be included in household financial wealth.

Figure 2. Percentage growth in two measures of per capita consumption



Source: National Accounts, Statistics Sweden, and own calculations.

Figure 2 shows two measures of the development of percentage growth in per capita consumption. The first series is the growth in consumption expenditures, including purchases of consumer durables, and the second is the growth in "pure" consumption, which is measured as the sum of purchases of non-durables and the imputed consumption value from the stock of durables and owner-occupied housing. Irrespective of the preferred definition, two features stand out. First, the consumption bust in the early 1990s is quite extreme, and it has no counterpart in the previous postwar period. Second, the consumption bust was preceded by a consumption boom that started in the mid 1980s. The boom to bust cycle is particularly evident for consumption expenditures; the peak in 1986–87 is to a large extent driven by strong growth in purchases of durables.

How can we explain it? A basic observation is that the Swedish experience is far from unique. Indeed, as discussed by Berg (1994), consumption has gone through the same cycle in all the Nordic countries, with a consumption boom followed by a sharp spending reversal; see Table 3. The table also suggests that the official household savings ratio in all four coun-

Table 3. From boom to bust: average growth rates of consumption and income, and changes in selected macroeconomic variables in the Nordic countries

	Denmark		Finland		Norway		Sweden	
	1982–1986	1986–1992	1987–1990	1990–1992	1984–1987	1987–1992	1986–1989	1989–1992
	Real rate of growth of: (in per cent)							
Private consumption	3.4	0.7	3.1	–2.0	4.3	–0.3	3.4	0.1
Disposable income	1.3	1.6	2.6	0.4	1.6	1.6	1.6	3.2
Real housing prices	84.0	–14.0	32.0	–35.0	27.0	–36.0	32.0	–12.0
	Changes in: (in percentage points)							
Household savings rate	–15.6	9.9	–2.1	5.7	–11.5	11.2	–6.2	12.3
Household net lending rate	–22.1	15.6	–4.9	12.6	–13.6	19.0	–5.8	13.8
Unemployment	–2.7	4.0	–1.7	9.7	–1.0	3.8	–0.9	3.7
Government net lending to national disposable income	8.0	–7.0	5.0	–13.0	–4.0	–6.0	7.8	–15.4

Source: Berg (1994) and own calculations.

tries largely mirrored changes in net lending. During the boom years, net lending (excluding supplementary pension savings) was negative. The second period witnessed a dramatic change in the opposite direction; compared with the development in Denmark and Norway, the swings in the Swedish net lending rate seem anything but exceptional. Thus, it seems natural to look for common, rather than country specific, explanations. Another observation is that the bust period coincides with tax reforms in all four countries. Denmark introduced limits on the deductibility of interest expenses in 1987. The Norwegian tax reform in the same year lowered marginal tax rates, and hence the value of interest deductions. In 1989 Finland also took a moderate step in the direction of reducing various asymmetries in the taxation of capital income. However, invoking tax factors is certainly not the only way of explaining the Nordic experience. Let us briefly review some of the main stylised macroeconomic facts.

The strong consumption growth and negative figures for net financial savings during the first time period of Table 3 coincide with the *deregulation of financial markets* in the Nordic countries. As noted by many observers, a loosening of borrowing constraints may explain why consumption went up and net financial savings were in the red. It may also help to explain why the trend reversal became so dramatic in the second time pe-

riod, when adverse macroeconomic shocks hit the Nordic countries (and Finland and Sweden in particular). In an economy with a heavily regulated credit market, consumption can be expected to track disposable income rather closely. However, in a deregulated environment consumers are more likely to respond to changes in expected future income, interest rates and taxes, implying a more pronounced macroeconomic propagation mechanism.

According to the life cycle/permanent income model of consumption, *capitalisation effects* in asset markets, whether due to deregulation or something else, ought to affect consumption. And as we show in the table, the boom period was indeed associated with an increase in house prices in all the Nordic countries, and the bust period with decreasing prices. However, correlation is not the same as causation. In a structural macro model we would expect asset prices to be determined jointly with consumption. In an attempt to deal with this endogeneity problem, Koskela and Virén (1992) examined the cross correlation between savings and housing prices in the Nordic countries, and found some evidence that housing prices led rather than lagged the household savings ratio. As housing prices can be expected to depend on real after-tax interest rates, this suggests that tax changes can affect consumption via revaluations in asset markets.

Capital gains on housing are not the only volatile time series in recent years. In all Nordic countries the consumption bust was accompanied by a dramatic increase in unemployment. The mirror image of this increase is a large increase in the budget deficits of the general government sectors (except in Norway). If we temporarily disregard the possibility of reverse causation, we may ask how unemployment and deficits can affect consumption growth.

A first possibility focuses on the effects on the *expected growth of future income*. Higher unemployment may induce consumers to make a downward revision of their forecasts of future labour income. A similar effect occurs if consumers expect that the government will deal with the deficit primarily by raising future and potentially very distortionary taxes, rather than cutting spending.[2] In either case, permanent income, and hence consumption, will decrease. Incidentally, a permanent income argument

[2] The idea that a large and rapidly increasing government deficit may induce consumers to reduce spending is developed in some detail by Giavazzi and Pagano (1990, 1995). They also make the related point that a severe fiscal contraction may actually boost consumer confidence and private spending.

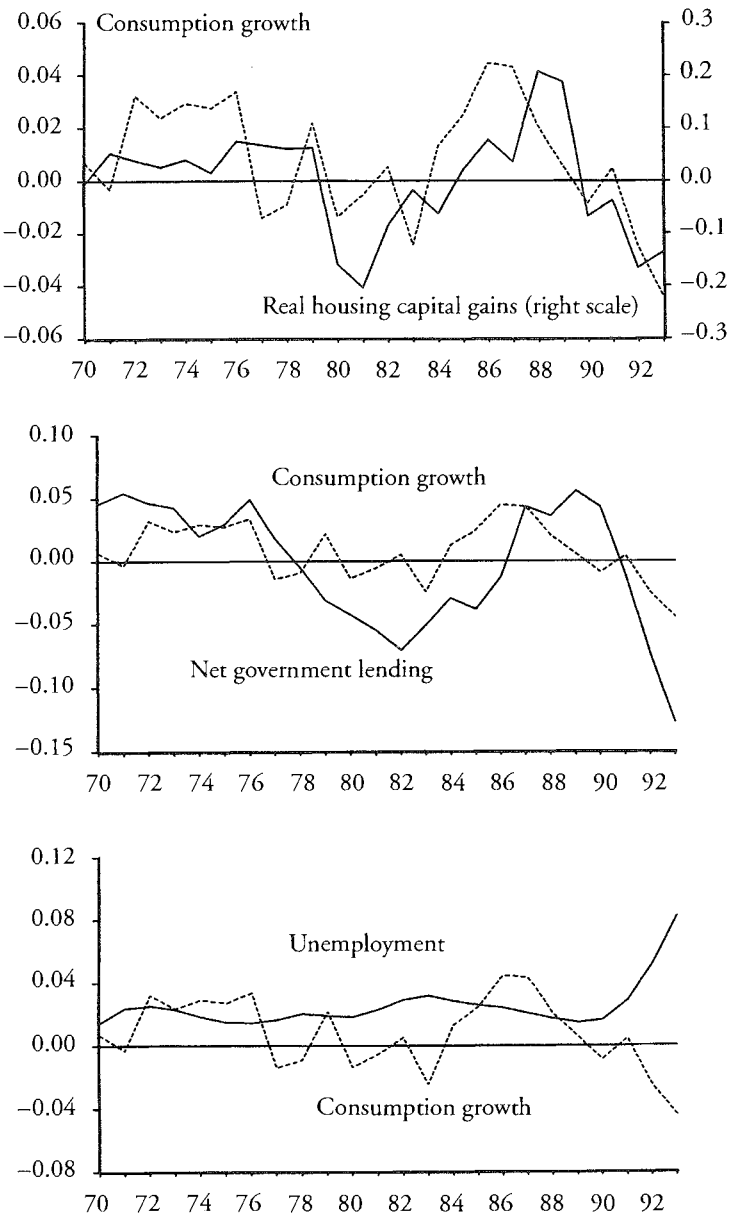
may also go some way towards explaining the consumption boom of the 1980s. If, in the mid 1980s, Swedish households increased their expectations of future income (perhaps because of falling unemployment and a rapid consolidation of the government's balance sheet), a consumption "boom" accompanied by increased borrowing would be the natural outcome. Thus, pointing to the effects of financial deregulation is not the only way of interpreting aggregate consumption data.[3]

The second possibility, much emphasised in the Swedish policy debate, is that unemployment and deficits may slow consumption growth by inducing more *precautionary savings*. In the case of unemployment, it is not very hard to argue that a sharp increase in aggregate joblessness may increase the uncertainty about future income prospects. The key observation in terms of the deficit is that the Swedish welfare state provides social insurance against a great number of human capital related risks. In a situation where the budget deficit follows a seemingly unsustainable path, consumers may come to the conclusion that the government will be less able to provide income protection in the future. As households respond by building up their own savings buffer, consumption growth decreases, or becomes negative.

As a preamble for more detailed analysis, Figure 3 plots the annual comovement of consumption growth with housing capital gains, unemployment and net government lending in Sweden. A casual examination suggests that most of the visible correlation stems from observations since the early 1980s. This characteristic is also borne out when we compute the simple correlations for different periods. In the subperiod 1970–81 the correlation between consumption growth and unemployment is –0.08; in the 1982–93 period the same correlation is –0.71! Our correlations also suggest that some of our prospective explanatory variables are subject to a multicollinearity problem. In the most recent subperiod the correlation between government net lending and unemployment is –0.86, while the correlation between government net lending and housing capital gains is 0.98. In short, the macroeconomic instability in recent years implies that it is hard to find much independent variation in many of the variables that may explain consumption.

[3] In a recent paper, Attanasio and Weber (1994) present evidence which suggests that the UK consumer boom in the late 1980s might have about as much to do with permanent income dynamics as with financial liberalisation.

Figure 3. Consumption growth, real capital gains on housing, unemployment, and government net lending to GDP, 1970–93



Note: Consumption growth is the per capita growth in consumption expenditures. Real capital gains on housing are defined as the inflation adjusted kronor value of accrued capital gains as a fraction of disposable income. Unemployment is the measure of open unemployment according to the Labour Force Survey. Government net lending includes the consolidated public sector.

Source: Statistics Sweden, and own calculations.

3. Intertemporal substitution

The main purpose of this section is to take another look at the magnitude of the intertemporal elasticity of substitution. The intertemporal elasticity of substitution is an important determinant of the link between consumption growth and expected real interest rates. With a substantial elasticity, periods of high real interest rates should coincide with rapid consumption growth, beacuse a high interest rate induces individuals to consume less today and more tomorrow. Similarly, periods with low, or negative, real interest rates should coincide with stagnant, or even decreasing, consumption. Can this mechanism plausibly explain the recent Swedish boom to bust cycle? As we will argue shortly, the answer is no.

Since the seminal work of Hall (1978), many researchers have adopted the "Euler equation" approach of directly estimating the intertemporal first-order condition for an infinitely lived representative consumer, with access to a perfect capital market. In its original form the Euler equation was expressed in terms of consumption levels. It built on the assumption of a time invariant interest rate, and the important proposition was that only consumption lagged once ought to forecast the current consumption level. More recent formulations have allowed for variations in the real interest rate. Under the maintained hypothesis that the underlying representative agent model is a correct way of describing aggregate data, the implied estimating equation can in principle be used to obtain an estimate of the intertemporal elasticity of substitution (see e.g. Hall (1988)).

A recent example in this tradition is Campbell and Mankiw (1991), who fit an Euler specification with a variable interest rate to quarterly data for six countries, including Sweden. The somewhat unconventional aspect of their model is that it also accounts for the existence of "rule of thumb" consumers operating alongside forward-looking permanent income households. Unlike permanent income households, rule of thumb consumers consume their current income in each period, perhaps because of liquidity constraints. Campbell and Mankiw found no evidence of a significant effect of real interest rates on consumption growth – the implied point estimate of the intertemporal elasticity of substitution "...is as often negative as positive, and it is never statistically significant" (Campbell and Mankiw, p 738). In an international comparison, their results also suggest that the fraction of rule of thumb consumers is fairly small in Sweden, which is well in line with previous findings of Jappelli and Pagano (1989).

In the following we update the work of Campbell and Mankiw. We use a more recent data set, which captures much of the recent volatility in Swedish aggregate data (our final observation is the fourth quarter of 1993, while Campbell and Mankiw use quarterly data over the period 1972–88). As there is no single correct way of identifying the interest rate that governs intertemporal behaviour, we also devote considerable effort to experimenting with a variety of return measures, before as well as after tax.

Consider first the behaviour of a representative permanent income household in the presence of a stochastic interest rate, r. Under standard assumptions the implied Euler equation can be approximated by the log-linear expression

$$E_{t-1}\Delta c_t^p = \mu + \sigma E_{t-1} r_t, \tag{2}$$

where E_{t-1} is the expectation conditional on all information available in $t-1$, Δ is the first difference operator, c_t^p is the logarithm of the consumption level of permanent income households in period t, μ is a constant which includes the variance of consumption growth, σ is the elasticity of intertemporal substitution, and r_t is the real interest rate contemporaneous with Δc_t^p. According to (2), a high expected real interest rate should induce a higher rate of consumption growth.

Rule of thumb consumers only respond to changes in disposable income. In terms of expectations we thus have

$$E_{t-1}\Delta c_t^r = E_{t-1}\Delta y_t^r, \tag{3}$$

where c_t^r and y_t^r are the logarithms of consumption and disposable income of rule of thumb consumers.

Eqs. (2) and (3) imply that aggregate consumption growth can be written as

$$E_{t-1}\Delta c_t = \alpha + \beta E_{t-1} r_t + \lambda E_{t-1}\Delta y_t, \tag{4}$$

where λ is the fraction of aggregate disposable income that accrues to rule of thumb consumers, $\alpha=(1-\lambda)\mu$, and $\beta=(1-\lambda)\sigma$. Actual consumption growth will differ from expected consumption growth by a surprise ε_t, which is orthogonal to $E_{t-1} r_t$ and $E_{t-1}\Delta y_t$; i.e. we have that

$$\Delta c_t = \alpha + \beta E_{t-1} r_t + \lambda E_{t-1} \Delta y_t + \varepsilon_t, \tag{5}$$

We estimate (5) using quarterly Swedish data on per capita consumption, per capita disposable income, and interest rates over the period 1976–1993. In some specifications, we consider the case of a constant expected interest rate. We refer to this version of (5), in which the interest term is subsumed in the constant, as the pure λ-model.

Although raw data since 1963 are available, recent revisions suggest the existence of rather severe measurement problems up to the mid 1970s; we thus follow the conservative approach of disregarding observations before 1975. Our measure of per capita consumption is the sum of spending on non-durables and services and the imputed rent on the stock of consumer durables. Per capita disposable income includes the sum of earned income and non-labour income (excluding capital gains). Both consumption and income data are available in seasonally unadjusted form, and we remove seasonality using standard moving average procedures. We experiment with different measures of the real interest rate, all measured at a quarterly rate. When we allow for taxation of interest income, we use a series on the average marginal tax rate of white-collar workers calculated by Du Rietz (1994).

If we could somehow observe the period $t-1$ expectation of the period t real interest rate and disposable income growth, (5) could in principle be estimated using ordinary least squares. In the absence of such information we resort to the same procedure as Campbell and Mankiw (1989, 1991), and estimate (5) using two-stage least squares. A final technical point is due to the fact that we only have access to time averaged consumption and income data, while the theoretical model refers to observations at distinct points in time. As discussed in some detail by Hall (1988), time averaging may then induce spurious first-order serial correlation in the error term, and a correlation between the contemporaneous error and all once lagged instruments. One way of dealing with this, used by Hall (1988), is to make an autoregressive transformation of the data. An alternative procedure, used by Campbell and Mankiw (1991), is to rely exclusively on instruments lagged more than once. Although this conservative procedure has much appeal, the disadvantage is that we may lose predictive power in the first stage regressions. To strike a balance we therefore present results for the case of instruments dated $t-1$ and earlier, as well as for the case of instruments dated $t-2$ and earlier.

Table 4 shows the results for the full time period, and for different

measures of the real rate of return. Rows 1–5 report results when the real rate of interest is defined as the quarterly *ex post* real rate of interest on government debt with three months to maturity (*T*-bills), before and after tax. Rows 6 and 7 use the quarterly return on corporate shares, and rows 8 and 9 the quarterly return on owner-occupied housing. For corporate shares and owner-occupied housing, we arbitrarily assume that the dividend yield in any quarter t is a constant, equal to .005, and then simply add on the quarterly *ex post* real capital gain. As the effective tax rate on capital gains is relatively low, we measure the real capital gain before tax. Turning to the columns, 4 and 5 show the adjusted R^2 for the first-stage OLS regressions of the real interest rate and income growth on the instruments; the figures in parentheses are the significance levels at which we can reject the null hypothesis that all coefficients, except the constant, are zero. Columns 6 and 7 give the estimates of β and λ, with standard errors in parentheses. Column 8, finally, shows statistics on the validity of our instruments. Although we have experimented with a variety of instruments (including lags of inflation, nominal interest rates, and unemployment), it turns out that lagged income growth rates and lagged real rates of return have the strongest predictive power. From row 5, it is also clear that the lag structure makes much difference. We obtain much better income forecasts when we include the first lag of the income growth rate (i.e. a potentially illegitimate instrument). The test reported in column 8 suggests that instrument invalidity is a lesser problem – except for row 6, there is no indication of a statistically significant correlation between the residuals from our TSLS estimations and the instruments.

With one exception, we find no positive and significant elasticities of substitution. Indeed, in the case of *T*-bills, the implied point estimates of σ are negative (except in the OLS regression of row 1), which violates the theory. We also see that allowing for taxation of nominal interest income makes little difference. The results for corporate shares suggest the presence of serious specification problems. In the case of the instrument set including lags 1–4, the test reported in the final column indicates that our instruments are significantly correlated with the residual of the TSLS estimations at the ten percent level. Also, our first-stage regressions show that neither lagged income nor lagged equity returns can predict the current equity return. As a consequence, the results in rows 6 and 7 are extremely unreliable. The results for owner-occupied housing in rows 8 and 9 are more encouraging. The real rate of return on owner-occupied housing is forecastable. The adjusted R^2 for the forecast equation with lags

Table 4. TSLS-estimates of $\Delta c_t = \alpha + \beta E_{t-1} r_t + \lambda E_{t-1} \Delta y_t + \varepsilon_t$ (1976:1–1993:4)

Row	Return measure	Lags of instrum.	First-stage regr., $\bar{R}^2$		β	λ	Instrum. test
			r	Δy			
1	T-bills, before tax	OLS	---	---	.020 (.073)	.127* (.030)	---
2	T-bills, before tax	1–4	.348 (.000)	.358 (.000)	–.148 (.115)	.134* (.047)	–.065 (.883)
3	T-bills, before tax	2–4	.352 (.000)	.043 (.181)	–.153 (.117)	.176* (.087)	–.042 (.792)
4	T-bills, after tax	1–4	.406 (.000)	.361 (.000)	–.136 (.104)	.132* (.046)	–.071 (.909)
5	T-bills, after tax	2–4	.407 (.000)	.044 (.176)	–.149 (.107)	.185* (.087)	–.054 (.877)
6	Corporate shares	1–4	–.013 (.536)	.393 (.000)	–.005 (.029)	.135* (.043)	.085 (.089)
7	Corporate shares	2–4	–.015 (.556)	.048 (.162)	.041 (.045)	.191 (.107)	–.024 (.637)
8	Owner-occupied housing	1–4	.428 (.000)	.405 (.000)	.120* (.052)	.114* (.043)	–.002 (.460)
9	Owner-occupied housing	2–4	.280 (.000)	.062 (.117)	.087 (.061)	.175* (.076)	–.015 (.556)

Notes: The definitions of the return measures are given in the text. In rows 2, 4, 6 and 8 we use the instrument set r_{t-1} ,..., r_{t-4}, Δy_{t-1}..., Δy_{t-4}, and in rows 3, 5, 7 and 9 r_{t-2} ,..., r_{t-4}, Δy_{t-2}..., Δy_{t-4}. Columns 4 and 5 report the adjusted R^2 for the first stage estimations (OLS) of the RHS variables on the instruments. The figures in parentheses give the significance level at which we can reject the null that the instruments have zero coefficients. Columns 6 and 7 give the TSLS estimates of β and λ, with standard errors in parentheses (an asterisk denotes significance at the five percent level). The final column gives the adjusted R^2 for the OLS regression of the TSLS residual on the instruments (the figures in parenthesis are the p-values for the null that all coefficients are zero).

2–4 is .280, and it rises to .428 with lags 1–4. Also, the point estimate of β is positive, and hence theory consistent. With lags 1–4 the β estimate is even significant, and consistent with a value of σ of .135, which is still very small, however. With our more conservative instrument set, β is no longer significant, and σ falls to .106.

It should come as no surprise that we find no clear relation between consumption growth and the real interest rate. Hall (1988) used annual long-run data for the US, and concluded that there is no strong evidence of a positive elasticity of substitution. In their regressions using quarterly Swedish data from the second quarter of 1972 to the first quarter of

1988, Campbell and Mankiw (1991) report point estimates of β ranging from .077 to –.062, neither of which is statistically significant.

The point estimate of λ, which can be interpreted as a rough measure of the fraction of liquidity constrained households, is quite stable across specifications, estimated with reasonable precision, and falling in a rough interval between .1 and .2. This is well in line with the findings of Campbell and Mankiw (1991); their λ-estimates for Sweden are statistically significant, with a high value of .257, and a low value of .123.[4] Conflicting evidence is reported in Jappelli and Pagano (1989), who examined the excess sensitivity of consumption to current income using annual data for seven countries, including Sweden. Unlike us, they did not identify a significant λ-parameter in Sweden. In conjunction with some complementary evidence, they view this as an indication of an unimportant role for capital market imperfections and liquidity constraints. As Jappelli and Pagano (1989) relied on data for a period (1965–83) when all credit market regulations were largely intact, we find their conclusion rather challenging.

It is time to summarise. A first basic observation is that it is very hard to identify an economically large intertemporal elasticity of substitution with any degree of precision. In fact, it is only when we invoke a rather unconventional return measure (owner-occupied housing) that we obtain a significant and theory consistent – but still very small – estimate of σ. Although there are many good reasons to be cautious about the information that can be drawn from combining representative agent models and aggregate data, the fact that our results conform well with those obtained for other countries, and other time periods, makes us believe that there is some ground for the proposition that σ is likely to be close to zero.

An obvious implication is that intertemporal substitution is a very unlikely candidate for explaining the Swedish boom to bust cycle. And even if we have got our econometrics all wrong, it is still very hard to reconcile some basic aspects of our data with a story that assigns a prominent role to intertemporal substitution. From the final quarter of 1986 to the final quarter of 1989, quarterly consumption per capita grew at a rate much above the average for the full sample. At the same time the average real interest rate after tax was negative. From the final quarter of 1991 to the final quarter of 1993, the average quarterly growth rate of consumption

[4] Assarsson (1991) is another study that reports excess sensitivity in Swedish Euler equations.

was negative, while the average real interest rate after tax was exceptionally high. If (5) is to be a valid representation of the data, consumption growth ought to have followed the opposite pattern.

What about the role of taxes? A value of the intertemporal elasticity of substitution close to zero does not in any way rule out the possibility of a negative link between current consumption and after-tax interest rates. To the extent that taxes, and tax reforms, affect real discount factors, consumption will still be affected via wealth effects in asset markets. In the next section we argue that this mechanism represents the most natural way of linking aggregate consumption behaviour and the tax reform of 1991.

4. An aggregate consumption function

Of course, there is much more to the study of consumption behaviour than estimating Euler equations. The purpose of this section is to explore the insights that can be gained from a traditional consumption function approach. The pros and cons of the two approaches are well known, and need not be elaborated at length (see e.g. Deaton (1992) and Muellbauer (1994)). As pointed out by Muellbauer (1994) a solved out consumption function complements the Euler approach in two important ways. First, the differencing of the data underlying the Euler approach eliminates important information on the long-run relationship between variables. Second, if a structural Euler approach is to be useful for policy analysis, the estimated first-order condition still needs to be combined with an intertemporal budget constraint that rests on certain expectational assumptions. Thus, there is no easy way of avoiding the Lucas critique, and a more traditional consumption function – which directly incorporates an intertemporal budget constraint – is no longer necessarily inferior to the Euler approach.

The solved-out consumption function we use is developed in detail by Muellbauer and Murphy (1993a, b), and it has previously been applied to Australia, Japan, the UK and the US.[5] An advantage of the model is that it allows us to explain secular and cyclical elements in consumption by a number of different factors, such as lags due to habit formation,

[5] See Muellbauer and Murphy (1993a, b), Muellbauer (1994) and Muellbauer and Lattimore (1994).

credit constraints applying for some households, uncertainty and expectations effects, different spendability weights for liquid and illiquid assets, and demographic effects. The benchmark model of Muellbauer and Murphy, which approximates a much richer theoretical structure, is given as:

$$\Delta \ln c = \alpha_0 + \beta(\ln y - \ln c_{-1}) + (1-\beta)\lambda \Delta \ln y + (1-\lambda)\beta\gamma A_{-1}/y + (1-\lambda)\beta\,\alpha_1 r + \text{other variables} \qquad (6)$$

The variables included in (6) are consumption, c, disposable income y, assets A, the real interest rate after tax r, and a set of other variables reflecting a number of potential determinants of consumption. The equation has an error-correction term, and the parameter β in front of that term is the adjustment parameter originating from the hypothesis of habit formation or adjustment costs in consumption. As in the model of the previous section there are two groups of consumers. A fraction λ of aggregate disposable income accrues to households that are subject to a binding liquidity constraint, and a fraction $1-\lambda$ to households which obey the rules of the permanent income model. For the first group of consumers the rate of growth in consumption is equal to the rate of growth in disposable income. For the second group of consumers the real interest rate and the asset to income ratio play a role.

In our empirical application we try out a number of different variables in the "other variables" category. In line with our discussion in Section 2 we include the changes in unemployment and government net lending as measures of uncertainty and income expectations. For much the same purpose we include the change in inflation in some specifications.[6] Like Muellbauer and Murphy (1993a, b) we have also experimented with a variety of demographic variables (various combinations of ratios between different age cohorts). However, none of these turned out to be significant.[7] In some specifications a dummy variable (equal to one for 1987–89, else zero) is included. We use this variable to capture the effects of omitted factors during the consumption boom of the late 1980s. When financial deregulation took place in the mid–1980s, there might

[6] There are several reasons why inflation may influence consumption. It may influence the return on assets, it can make the recorded real income deviate from that perceived by households, and it may capture the effects of income uncertainty; for a discussion, see e.g. Koskela and Virén (1985).

[7] Some previous studies have found a significant effect of demographic variables on consumption/savings in Sweden; see e.g. Bentzel and Berg (1983).

have been a temporary increase in household indebtedness and thus a drop in savings. Once households have adapted to the deregulation, savings should revert to its long term level.[8]

We also include a variable that is intended to capture the effects of transitory wealth on consumption. As we noted in Section 2, consumption is highly correlated with the development of real capital gains in the housing market, and our conjecture was that windfall gains in the housing market stimulate consumption. To construct a measure of transitory real housing capital gains we estimate a separate ARMA model for this variable, and include the resulting residual as an independent variable in the consumption function.

We use annual data for the period 1953–93. In applying the model for the US and UK, Muellbauer and Murphy (1993a, b) used data on consumption expenditures and labour income to represent consumption and income variables. However, as in the previous section, our measure of per capita consumption includes the sum of expenditures on non-durables and services and the imputed rent on the stock of consumer durables; i.e., we use a measure of pure consumption. Both life-cycle theory and the permanent income hypothesis emphasise the distinction between consumer expenditures and pure consumption, and in both models pure consumption is explained by households' optimal allocation of present and future resources over time. As we have no data on non-property disposable income (labour income), we use household disposable income as our income variable. Like Muellbauer and Murphy (1993a, b) we have experimented with different combinations of financial and real assets, using various lag structures and different weighting schemes, but unlike them we found that only net financial assets have explanatory power. In all equations reported below, A is the synonym for households' net financial wealth. To cope with reverse causation, we use instruments for the real interest rate, and the changes in unemployment, inflation and net government lending.

We report a selection of our regressions in Table 5. To help discriminate among the models, we also present a number of specification tests, including LM tests for first- and second-order serial correlation of the error term, and Chow stability tests for the years of the early 1990s. A

[8] Credit availability has been reported as a determinant of household savings and consumption in Sweden during the 1970s and the first half of the 1980s, see Bentzel and Berg (1983) and Berg (1990).

Table 5. Modelling Swedish consumption growth (1953–93)

	Dependent variable, $\Delta \ln c$							
	1	2	3	4	5	6	7	8
Constant	–0.022	–0.025*	–0.016	–0.018	–0.006	–0.012	–0.025	–0.032*
	(0.012)	(0.012)	(0.014)	(0.014)	(0.014)	(0.015)	(0.012)	(0.011)
$\ln y - \ln c_{-1}$	0.231*	0.298*	0.218*	0.269*	0.172*	0.230*	0.240*	0.323*
	(0.069)	(0.068)	(0.067)	(0.071)	(0.074)	(0.082)	(0.066)	(0.060)
$\Delta \ln y$	0.289*	0.261*	0.237*	0.209*	0.306*	0.283*	0.280*	0.243*
	(0.084)	(0.077)	(0.096)	(0.093	(0.083)	(0.082)	(0.078)	(0.068)
A_{-1}/y	0.032	0.021	0.026	0.016	0.005	0.003	0.039	0.037*
	(0.019)	(0.017)	(0.019)	(0.017)	(0.023)	(0.022)	(0.020)	(0.017)
House price innovation	0.139*	0.115*	0.118*	0.095*	0.084	0.077	0.119*	0.075
	(0.044)	(0.041)	(0.047)	(0.044)	(0.052)	(0.049)	(0.048)	(0.042)
r	–0.105	–0.147	–0.084	–0.109	–0.110	–0.143	–0.078	–0.107
	(0.078)	(0.075)	(0.082)	(0.082)	(0.078)	(0.078)	(0.076)	(0.067)
ΔU			–0.375	–0.406				
			(0.416)	(0.469)				
$\Delta GovN/y$					0.161	0.134		
					(0.084)	(0.085)		
ΔP							–0.121	–0.248
							(0.165)	(0.140)
K8789		0.021*		0.018*		0.015		0.022*
		(0.007)		(0.007)		(0.008)		(0.006)
R^2 adjusted	0.6638	0.7147	0.7112	0.7520	0.6700	0.6900	0.7124	0.7889
Stand. error	0.0095	0.0088	0.0088	0.0082	0.0095	0.0092	0.0088	0.0076
LM $\chi^2(1)$	0.22	0.02	0.00	0.00	0.00	0.00	0.55	0.38
LM $\chi^2(2)$	0.08	0.01	0.00	0.00	0.00	0.00	0.76	0.76
Chow 91–93	0.00	0.01	0.00	0.01	0.03	0.11	0.00	0.01
Chow 92–93	0.00	0.00	0.00	0.00	0.01	0.05	0.00	0.00
Chow 93	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
λ	0.38	0.37	0.30	0.29	0.37	0.37	0.37	0.36

Notes: Standard errors are in parentheses (an asterisk denotes significance at the five percent level). The variables are: y and c adjusted disposable income and pure consumption, A financial net wealth, *House price innovation* residual of an ARMA(2,3) process for change in real house prices, U rate of unemployment, P rate of inflation, *GovN* general government net lending, r real after tax interest rate, *K8789* a dummy variable equal to 1 for the indicated years. c, y, A and *GovN* are expressed in per capita terms and 1985 prices. LM $\chi^2(1)$ and LM $\chi^2(2)$ give the p-value for the Breusch-Godfrey test for first and second order serial correlation. For the Chow forecast test the given values are the p-value for the χ^2-statistics. For all three tests, a p-value greater than 0.05 indicates that we cannot reject the null at the 5 percent level. In all models we instrument r, ΔU, ΔP and $\Delta GovN/y$. Our instrument set consists of the lagged value of the variable itself, the actual and lagged value of $\ln y - \ln c_{-1}$, $\Delta \ln y$, A_{-1}/y, *house price innovation*, the constant term and *K8789*.

quick glance across the equations suggests that our reexamination of the Swedish consumption function is somewhat of a mixed success. Some equations are marred by serial correlation, and all equations have a hard time tracking the consumption bust of the early 1990s. For the years 1992–93, all models overstate actual consumption growth. The Chow forecast test reported at the bottom of the table suggests that the negative errors in our consumption functions are significant during the early 1990s. The specification in column 8 is a case in point. Together with the model in column 7 this is in many ways a satisfactory specification, in the sense that it produces reasonable estimates for all explanatory variables, shows a high adjusted R^2, and passes both LM tests for serial correlation. But it overstates consumption growth by close to 2 percentage points for each of the years 1992 and 1993.

Turning to the results for specific variables, the speed of adjustment in consumption (the lag parameter β) is estimated at 0.32 in model 8. The interpretation of this figure is that about one-third of the gap between desired and actual consumption growth for unconstrained consumers is adjusted within the period. Comparable estimates reported by Muellbauer (1994) range from 0.46 for Australia and 0.51 for the US to 0.66 for Japan and 0.7 for the UK. The implied estimates of λ are reported in the last row of the table. Compared with the results of the previous section, based on quarterly data, they are about twice as high. Model 8 implies a consumption share of 36 percent for credit constrained households. One reason for this relatively high figure could be that our annual data set covers a much longer period when credit market regulations were largely intact. With the exception of the last two models, which we prefer for statistical reasons, the wealth variable is never precisely estimated. Its significance level depends crucially on the other conditioning variables. The real interest rate effect is negative everywhere, but only close to significant in model 2, which suffers from serial correlation.

Our experimentation with proxy variables for uncertainty and income expectations do not produce any robust results. Our own *prior* was that the change in unemployment could explain a significant part of the consumption bust of the early 1990s, by inducing precautionary savings. And when we use OLS to estimate a basic Muellbauer and Murphy specification appended with the unemployment variable this indeed seems to be the case (this regression is not reported in the table). However, once we use TSLS to control for reverse causation the effect disappears (models 3 and 4). The positive and nearly significant sign for the government net

lending variable in models 5 and 6 is consistent with the idea of Giavazzi and Pagano (1990, 1995) that a fiscal consolidation may stimulate consumption. However, compared with models 7 and 8, where we include the change in inflation, the standard errors of the equations are much higher, and serial correlation is a serious problem. Another observation is that the government lending variable robs A_{-1} of any explanatory power.

Less surprisingly, the dummy variable for the 1987–89 period is significant in most models where we include it. As the exponential of the constant in the Muellbauer and Murphy model can be interpreted as the marginal propensity to consume out of income, the interpretation is that the marginal propensity to consume out of income increased towards the end of the 1980s. Although the deregulation of financial markets is one factor that may explain the consumption boom, we should again repeat our word of caution that there are other ways of interpreting this particular episode.

For the specific purpose at hand, the variable capturing the effects of windfalls in the housing market is of particular interest. It has the expected sign in all models, and it is estimated with reasonable precision in models 7 and 8. The interpretation of the point estimate in model 8 is that a windfall of 100 kronor in the housing market boosts current consumption by 7.5 kronor. This finding is in stark contrast to the results of Koskela and Virén (1992, 1994), who found no effect of housing prices on the NA savings ratio in Sweden. On the other hand, Berg and Bergström (1995) report results indicating that both financial and housing wealth became more important determinants of savings behaviour in Sweden during the 1980s and early 1990s.

In this section we have tried out a number of alternative specifications of the consumption function. Our results indicate a fairly strong tendency of habit formation in consumption, and that a certain percentage of households is liquidity constrained. In our preferred specifications we also find that net financial wealth and windfalls in the housing market play a role. The significance of the latter variable suggests that the tax reform has curtailed consumption growth via capitalisation effects in the housing market. Brownstone *et al.* (1985) estimated that the tax reform in Sweden in 1983–85, which imposed a cap on the value of interest deductions, reduced real house prices by some 15 percent. Åsberg and Åsbrink (1994) report simulations implying that the tax reform of 1991 may have lowered house prices by as much as 25 percent.

It might be asking too much to expect aggregated time series models

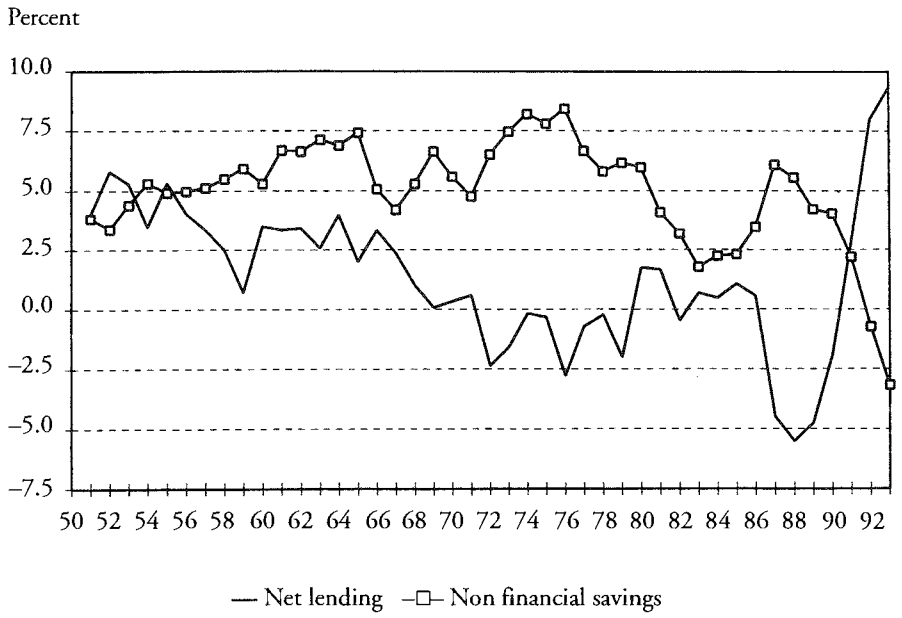
to pick up all the volatility of Swedish consumption during the boom to bust cycle. Although we have experimented with several explanatory factors often proposed in the literature, there still remain large negative errors in the consumption function for 1992–93, once we control for reverse causation. Should we blame the negative residuals on the tax reform? We believe that the answer is no. Our regressions do account for some of the more plausible links between tax structure and consumption, including the real interest rate after tax and tax induced windfalls in the housing market. Also, the potential effect of the tax reform on consumption via the fiscal balance of the government is captured by the government net lending variable.[9] Another possibility is that the tax reform has affected permanent income negatively via some other channel. However, most assessments of the efficiency effects of the tax reform suggest that it lowered excess burdens (cf. Agell, Englund and Södersten (1995)). If anything, this effect – which is absent from our models – ought to increase permanent income, and hence consumption. We are left with the conclusion that there is something else going on. Either there is some important omitted variable, or consumption behaviour has changed in a more profound way during the economic depression of the 1990s.

5. Taxes and the composition of aggregate savings

One lesson from the two previous sections is that it is hard to make the case that the tax system has been a very important factor behind the development of aggregate consumption. Matters look different when we turn to the development of household savings composition. As discussed in Section 2, the main part of savings during the 1970s was invested in non-financial assets like housing and durables. In the beginning of the 1990s the situation was quite the opposite, as households shifted from non-financial to financial assets. Figure 4 shows the development since 1950 of two components of the adjusted savings ratio of Figure 1, net lending and the sum of non-financial investments in homes and consumer durables. Over the full sample period the correlation coefficient between net lending and investment in non-financial assets is –0.47. In

[9]According to calculations reported by Agell, Englund and Södersten (1995), Kristoffersson (1995) and Ohlsson and Vredin (1994) the tax reform was underfinanced by an amount corresponding to between 2 and 2.5 percent of GDP.

Figure 4. Saving ratios for net lending and non-financial savings (1951–93)



Source: See Table 2.

the subperiod 1985–93 the correlation increases to –0.96! Correlations such as these strongly suggest that the two savings ratios have some determinants in common. In the following we shall see whether observed changes in relative returns can explain the volatile development of the lending ratio.

According to our discussion in Section 2 the tax reform implied a large change in the relative tax treatment of financial and non-financial savings, primarily because of a reduction in the effective tax rates on financial savings. But the tax reform also had important consequences for the treatment of negative financial savings, i.e., borrowing. In Sweden net interest expenses remained fully deductible against the marginal tax rate until 1982. As the tax system was highly progressive with a top marginal tax of around 80 percent, the tax authorities in effect paid the greater part of the nominal interest cost for many households. The tax reform of 1983–85 reduced the maximum value of interest payments to 50 percent, and a further change in 1989 lowered the cap to 47 percent. The tax reform of 1991 brought the cap in line with the new flat tax rate of 30 per-

Table 6. Real interest rate, after tax for selected years

		1980	1989	1991
1.	Interest rate	14.0	14.0	14.0
2.	Tax effect	8.7	6.6	4.2
3.	Interest rate after tax (1–2)	5.3	7.4	9.8
4.	Inflation rate for coming year	12.3	10.2	2.6
5.	Real rate of interest, after tax (3–4)	–7.0	–2.8	7.2

cent on capital income. The consequences for real borrowing costs in times of inflation are well known, and Table 6 presents some simple calculations on the real borrowing rate after tax for three separate years, 1980, 1989 and 1991. The nominal borrowing rates are the actual averages for the three years, the inflation rates are the actual ones over the coming year, and the marginal tax rates are 62, 47 and 30 percent, respectively. The result is astounding! The real cost of borrowing increased by almost 15 percentage points between 1980 and 1991.

If households ever respond to economic incentives, we would certainly expect to see some time-series correlation between the net lending ratio and measures of relative returns and tax treatment.[10] To shed some light on this, Table 7 reports the results from some simple regressions of the net lending ratio of Figure 4 on some potential explanatory variables. In a longer version of this paper we use a simple two asset portfolio model – and some strong assumptions – to derive a regression equation for the net lending ratio of the form[11]

$$NLR = \alpha_0 + \alpha_1 Return + \alpha_2 \Delta Return \qquad (7)$$

where *NLR* is aggregate net lending as a fraction of disposable income, *Return* is the difference between the nominal rate of return on net lending and the nominal rate of return on nonfinancial assets, and $\Delta Return$ is the corresponding change in nominal relative returns. Our empirical proxy for *Return* is the difference between the nominal borrowing rate after tax and the percentage change in nominal house prices. In addition to the return variables, we include, in some of the specifications, disposable

[10] Previous studies based on aggregate Swedish data indicate that household asset composition responds to relative returns, see Palmer (1984) and Berg (1988).
[11] See Agell, Berg and Edin (1995).

Table 7. Modelling the savings ratio for net lending (1953–93)

	Dependent variable, ratio for net lending – *NLR*				
	OLS 1	TSLS 2	TSLS 3	TSLS 4	TSLS 5
Constant	0.006 (0.004)	0.006 (0.004)	0.008* (0.004)	0.000 (0.004)	0.002 (0.004)
Δ*Return*	0.267* (0.076)	0.278* (0.084)	0.242* (0.083)	0.213 (0.145)	0.281* (0.126)
Return	0.100 (0.061)	0.111 (0.061)	0.117* (0.058)	0.197* (0.073)	0.230* (0.091)
$\ln(y/y_{-1})$				0.615* (0.211)	0.588* (0.199)
ΔU				0.323 (1.168)	
$\Delta GovN/y$					0.060 (0.146)
NLR_{-1}	0.733* (0.106)	0.722* (0.106)	0.707* (0.101)	0.638* (0.118)	0.655* (0.114)
C87			–0.033* (0.015)	–0.021 (0.016)	–0.023 (0.020)
R^2 adjusted	0.7868	0.7860	0.8079	0.8195	0.7616
Stand. error	0.0150	0.0150	0.0142	0.0138	0.0158
LM $\chi^2(1)$	0.51	0.58	0.70	1.00	0.44
Chow 86–93	0.27	0.58			
Chow 88–93			0.13	0.44	0.13
Chow 90–93	0.29	0.67	0.26	0.76	0.82

Notes: Standard errors are in parentheses (an asterisk denotes significance at the five percent level). *Return* is defined as $(1-MT)R-Ph$, where R is the nominal interest rate, MT the marginal tax rate for capital income, and Ph the nominal change in house prices. y is disposable income, *GovN* general government net lending, U the unemployment rate, and *C87* a dummy variable, equal to one in 1987, otherwise zero. *NLR*, y and *GovN* are expressed in per capita terms and 1985 prices. LM $\chi^2(1)$ gives the p-value for the Breusch-Godfrey test for first-order serial correlation. For the Chow forecast test we present the implied p-values for the F-statistics. For both tests, a p-value greater than 0.05 indicates that we cannot reject the null at the 5 percent level. The instrument set used for models 2–5 is a constant, MT, MT_{-1}, R, Ph_{-1}, $\ln(y/y_{-1})_{-1}$, ΔU_{-1}, $(\Delta GovN/y)_{-1}$ and NLR_{-1}. For models 3–5, the instrument set include *C87*.

income growth, the first difference of the unemployment rate and a measure of the change in general government net lending. As in the previous section we may think of these variables as capturing rule of thumb behaviour, uncertainty, and income expectations. To capture the role of habit formation and adjustment costs, we also include the first lag of the

dependent variable. We have also experimented with a set of dummy variables for the period 1986–90. As can be seen in Figure 4, net lending fell dramatically during 1986–90, and the inclusion of a dummy variable for these years can give us a hint of influences from omitted factors, like the liberalisation of financial markets. With one exception we estimate all equations with TSLS.

All models show good performance in terms of adjusted R^2 and standard error of regression. There is no evidence of first order serial correlation in the residuals in any of the models, and all pass the Chow forecast test for different time periods. Consequently, our models for the net lending ratio seems to be stable in the 1990s, which was not true for the consumption function of the previous section. Note also that neither the change in the rate of unemployment nor the government lending variable is significant.

We find that both return variables have the expected sign in all the models. Moreover, in all equations either the return measure in level form, in difference form, or both, turn out to be significant at the five percent level. These tests of a simple model give a strong indication of the existence of an aggregate portfolio response to changes in relative returns. It is of some interest to see what our estimates imply about magnitudes. We have used the long-run value of the estimated parameter for the return variable of the model in column 3 for some simple calculations.[12] Our variable *Return* changed by 16.4 percentage points between 1986 and 1993. According to our estimates this change contributed 6.4 percentage points to the change in the net lending ratio. The long-run effect predicted by the model is thus close to the actual development of the net lending ratio (an increase by 8 percentage points).

All in all, our conclusion is that the development of the composition of aggregate savings represents much less of an intellectual challenge than the development of aggregate consumption. Most of the volatility of the lending ratio can be interpreted in terms of a portfolio adjustment to changing relative returns. While relative returns may change for a number of reasons, our calculations are consistent with the view that the tax reform is an important factor behind the dramatic increase in the lending ratio in the early 1990s. According to a simple simulation with the model

[12] When the first lag of *NLR* is included among the explanatory variables, we obtain the long-run effect of an exogenous explanatory variable after dividing the coefficient for the variable in question by one minus the estimated value of the coefficient for NLR_{-1}.

of column 3, the net lending ratio would, *ceteris paribus*, be 2.5 percentage points lower in the long-run if we hold the marginal tax rate constant at the 1990 level. As this simulation only captures the effect of the tax reform on the interest rate after tax, and as it disregards any implied effect on expected housing returns, we view the simulated response as a plausible lower bound for the true adjustment to the tax reform.

6. Tax clientele effects

Our analysis would not be complete without an account of the developments at the micro-level. Previous work suggests that the old Swedish tax system created strong tax clientele effects, since individuals tended to specialise in assets according to their marginal tax rate; see Agell and Edin (1989, 1990). As all taxpayers now face the same flat tax rate on capital income, the tax clientele effects ought to disappear in the post-reform years. In the process of eliminating various tax shelters, we should also observe disproportionate portfolio adjustment of individuals with high marginal tax rates under the old system. Here we will present new evidence on the relationship between household portfolio composition and household tax rates. After comparing a succession of cross sections since the late 1970s, our surprising conclusion is that most tax clientele effects were already gone by the mid 1980s, long before the tax reform.

Our data source is the HINK survey of Statistics Sweden. This annual survey is based on the income tax forms of a stratified random sample of households, and it provides detailed information on the sources of taxable income and deductible expenses, and on the kronor values of around thirty different categories of assets and liabilities. Whenever possible, the asset holdings have been transformed into market values. The income tax data are complemented by a mail questionnaire providing information on a set of demographic and socio-economic variables. A broad description of households' portfolios for 1981–91, with an emphasis on household indebtedness, is given in Edin, Englund and Ekman (1994).

We have previously used the 1979 and 1984 HINK surveys to estimate asset demand functions; see Agell and Edin (1989, 1990). In these studies we relied on a specification proposed by King and Leape (1984), which involves estimating probit models for the discrete choice of whether to hold a particular asset or not, and conditional demand equations for the same asset (i.e., how much to hold given ownership). Our conditional

demand equations, estimated using the Heckman two-step procedure to avoid selection bias, have the form

$$\ln y_{h,j} = \Sigma_k \alpha_{j,k} d_{h,k} + \beta_j X_h + \gamma_j t_h + \varepsilon_{h,j} \qquad (8)$$

where $y_{h,j}$ denotes asset j's share of household h's portfolio, d_k is a dummy variable that takes the value one if household h holds portfolio k, and the summation runs over all portfolios that include asset j. These dummy variables are included to reflect spillover effects on asset demands from the particular combination of other assets held by the household. The vector X contains different household characteristics, and t_h is the marginal tax rate of the household head. In this specification the tax effects are identified from differences in marginal tax rates across households.[13] As the marginal tax rate in the pre-reform years depended on the assets that were included in the portfolio we can not treat t_h as exogenous in our regressions. To avoid endogeneity bias we have therefore imputed the marginal tax rate, by applying the formal rate schedule to the sum of labour income and an imputed return on net wealth.

We summarise the estimated tax effects for different pre-reform years in Table 8, where we show the elasticities of asset demand with respect to the marginal tax rate evaluated at the sample means. As we calculate these elasticities using asset demand equations for both the discrete choice and the conditional demand, they reflect combined adjustments along the discrete and continuous portfolio margins. In the first two columns we report the tax elasticities for 1979 and 1984 from Agell and Edin (1989, 1990). These estimates are based on samples that exclude farmers and households with income from self-employment, as well as households with negative reported net wealth. The figures suggest that different assets differ substantially in their sensitivity to marginal tax rates. In 1984, in particular, there is strong evidence that high-taxed households tended to have high portfolio shares for debt and financial assets (tax savings schemes, bonds, and common stock). We interpret this as indicating that households with high marginal tax rates found it profitable to debt-finance financial assets.

In the next two columns we report the corresponding tax elasticities

[13] The estimated tax parameters involve both "behaviour" and the relationship between formal marginal tax rates and effective tax rates on different assets. This is due to the fact that the effective tax rate is not identical to the marginal income tax rate, and the relationship between the two tax rates will differ across assets.

Table 8. Tax elasticities with respect to the marginal tax rate

	1979	1984	1988	1989
Imputed return (r) on net wealth	r=.075	r=.10	r=.10 (r=.00)	r=.10 (r=.00)
Homes	.39	−.29	−.14 (−.004)	−.08 (.01)
Children's wealth	−1.05	- - - a)	- - - a)	- - - a)
Bank savings	1.21	.96	.30 (−.05)	1.46 (1.23)
Tax savings schemes	3.27	3.11	.69 (.40)	1.43 (.92)
Bonds	2.30	2.27	−.06 (−.20)	1.69 (1.46)
Common stock	1.90	3.32	−.90 (−.56)	−.002 (.26)
Other assets	.48	.99	.77 (.48)	.59 (.95)
Mortgage debt	1.43	1.33	.16 (.09)	.21 (.29)
Other liabilities	−1.60	1.10	−2.40 (−.59)	−1.08 (−.29)

a) Included in other assets.

Source: Agell and Edin (1989, 1990), and authors' computations from HINK 1988 and 1989.

for 1988 and 1989.[14] We report two different sets of tax elasticities for each year based on different imputations of the marginal tax rate. First, we report estimates based on a tax rate calculated using labour income plus a ten percent return on net wealth (r=.10) as taxable income. These estimates are reported to facilitate the comparison with the 1984 elasticities, which are based on the same assumption. The second set of elasticities (in parentheses) are based on a marginal tax rate imputed from labour income only (r=0). We prefer the second set of elasticities, since there are reasons to believe that the first procedure of calculating tax rates may depend on household portfolio choice. Households that choose to invest in assets which are undervalued or unreported in the tax returns, such as coops and works of art, will have a lower imputed tax rate than

[14] We have used the same sampling schemes as before, but the elasticities are based on a somewhat simplified version of the estimated asset demand functions ignoring the (endogenous) spill-over effects. Experiments with exogenous spill-over dummies produce qualitatively identical results.

households with assets that are accurately measured, such as homes and bank savings.

Somewhat surprisingly, we find much less evidence for strong tax effects in 1988 and 1989. In most cases the calculated tax elasticities are numerically much smaller than the 1984 elasticities. Furthermore, out of the 16 estimated tax parameters (two for each asset – one probit and one conditional demand parameter) for 1988, only 4 are statistically significant. This is very different from the 1984 results, where 14 out of 16 tax parameters were significant at the five percent level. These results suggest that the tax clientele effects had become less important already before the 1991 tax reform. A potential explanation is that the connection between the marginal income tax rate, which varied a great deal across households, and the effective tax rate on asset income had become weaker. A good example of this is the limitation on interest deductions, referred to above. The cap on interest deductions introduced in 1985, and sharpened in 1989, reduced the differences among households in the cost of borrowing, and thereby the scope for tax clientele effects in debt. To the extent that the 1984 results are driven by borrowing of high tax households to invest in financial assets, the limitations on interest rate deductions may be the main reason for the weak tax effects in both debt and financial assets.

The pre-reform cross-section evidence thus suggests that most of the tax clientele effects were gone already before the reform. If this result is true, the tax reform should in fact affect the portfolio choice of different households in a fairly uniform manner. In particular, the adjustments of households with high pre-reform marginal tax rates should not be significantly different from the adjustments of households with low pre-tax marginal tax rates. And in fact this pattern is exactly what we can see in the data. To examine how individual households actually changed their asset portfolios in response to the tax reform we have utilised data from the 1989/1992 panel of HINK. The panel estimates, which are reported elsewhere,[15] are very much in line with the cross-section results in Table 8. Households which received a large reduction in their marginal tax rates did not change their portfolios in a way that was very different from households which were less affected by the reform.

To conclude, we have found evidence that the substantial tax clientele effects that were present in asset demand equations for the late 1970s and early 1980s seem to have become much less important already before the

[15] A documentation of the panel study is given in Agell, Berg and Edin (1995).

1991 tax reform. We hypothesise that this pattern may be explained by the tax reform efforts of the mid–1980s. As these earlier reforms did much to reduce differences in real after-tax borrowing costs across households, tax clientele effects in debt became less important. The tax reform of 1991 further lowered the cap on interest deductions, but it affected most households in more or less the same way. Our macroeconomic analysis in the previous section suggests that the tax reform had a fairly strong impact on aggregate savings composition, while our microeconometric analysis suggests that it had a uniform impact on different households.

7. Concluding remarks

This paper has covered a lot of ground, and we need not repeat the summary from the introduction at length. The Swedish boom to bust cycle in consumption is a distinct challenge for students of consumption behaviour. After having tried out a variety of approaches, we are left with the conclusion that aggregate consumption behaviour might have changed during the economic depression of the 1990s. To the extent that the tax reform has contributed to the consumption bust, the main channel seems to be tax induced windfall losses in the housing market.

The role of taxes and relative return considerations seem much more important for household savings composition. In this area, the tax reform does matter. Without the tax reform, aggregate financial savings would have been lower, and real investments in housing and consumer durables higher. The other side of the coin is that the tax reform has most likely contributed to the sharp fall in aggregate demand during the depression. At the micro-level, our most important finding is that most of the tax clientele effects that were present in the data in the early 1980s were gone already before the tax reform. In short, in terms of portfolio and savings allocation, the tax reform may be interpreted as a general change in the macroeconomic environment, rather than a specific chock affecting particular households.

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