

# Inequality and Mobility of Wealth in Sweden 1983/84 - 1992/93<sup>§</sup>

by

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## Abstract

Using longitudinal data which include real estate wealth, financial assets as well as consumer durables, changes in the distribution of wealth in Sweden are related to major changes in asset prices and in incentives to hold various assets in the 1980s and the beginning of the 1990s. Our analysis of the mobility of wealth indicates that mobility is higher in Sweden than in the United States, while the analysis of who is gaining and who is loosing shows results similar to those of previous studies.

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## 1. Introduction

Historical estimates of the inequality of wealth in Sweden show a decline in inequality from the beginning of this century to the middle of the 1970's. According to the estimates in Spång(1987) the five per cent richest households owned 77 per cent of total net wealth at taxed values in 1920 but only 44 per cent in 1975. Jansson & Johansson(1988) got a somewhat lower estimate for total net wealth at market values in 1975, 38 per cent and almost the same figure for 1985, 37 per cent. The decline in the inequality of wealth thus came to a halt in the mid 1970's. An international comparison shows that the Swedish inequality in 1975 was comparatively low. In a table put together in Kessler & Masson(1987) the five per cent richest in most other countries included in their table held about 45 per cent of total net wealth with the exception of United Kingdom for which the estimate was 57 per cent.

Pålsson(1993) discussed the reasons why the inequality of wealth did not continue to decline. She suggested that this was the result of rather dramatic changes in asset prices. From a peak in 1979 the prices of owner occupied houses returned in 1985 to their mid 1960's level. Listed shares on the other hand more than doubled in price in the first half of the 1980's. As wealthy households held a relatively large share of stocks and shares while the owner occupied house was the major asset for most ordinary households she concluded that these changes in asset prices could explain why the trend in the inequality of wealth no longer decreased.

After 1985 the Swedish economy has experienced a few major policy shocks. The financial markets became deregulated which resulted in a credit expansion and an increased demand for credit financed real estate and consumer durables. The real estate prices continued to increase until the beginning of the 1990's and so did the prices of stocks and shares. The stock market peaked a little before the real estate market. Real interest rates after tax for a person who wanted to borrow money were negative until the beginning of the 1990's and increased sharply. Inflation averaged almost 7 per cent 1985-1991 with a peak close to 11 per cent in 1990. In 1992 inflation dropped to about 2 per cent. In this year the exchange rate of the Swedish crown was unsuccessfully defended by increased interest rates and in November the crown was untied from the ECU and left floating. The financial crises also had a major impact on the real economy and the Swedish unemployment rate started to increase and reached a level never experienced before.

At the end of the 1980s and the beginning of the 1990s major changes in the tax system were likely to influence household portfolios. Cuts in the marginal tax rates and limitations in the possibilities to deduct interest paid were introduced already in the second half of the

1980's, but a major tax reform was decided and implemented in 1990/91. This reform decreased the marginal income taxes, broadened the tax basis, and included major changes in the taxation of the returns from financial assets and real estate. In summary, the effects on the distribution of wealth were expected to become a decrease in the shares of liabilities, real estate and consumer durables and an increase in the share of financial assets, in particular, bank deposits and bonds.

This paper offers an analysis of the changes in the Swedish distribution of wealth after 1980 and in particular in the years before and after the tax reform with the additional purpose of relating the observed changes to policy and market changes. In doing this we rely on rather unique panel data which do not only permit an extension in time of previous studies but also for the first time a study of wealth mobility in Sweden. Below follows first a discussion of data issues and a comparison between two different data sources, then an analysis of total wealth and its components, the inequality of wealth, a multivariate analysis of changes in total wealth and finally the analysis of the mobility of wealth.

## **2. Data**

### *The HUS surveys*

The survey "Household Market and Nonmarket Activities" (HUS) is a panel survey of a random sample of Swedish households. Three waves include extensive wealth data, namely the 1984, 1986 and 1993 waves. In this study we will use all three but mostly concentrate on the last two. The sample size is rather small. The number of households included are 1505, 1772 and 1150<sup>1</sup> respectively. In all three waves questions about the wealth of the household were administered to the household head in a written questionnaire. The field work was done in the first half of the survey year and responses about assets applied to December 31 of the preceding year. In the sequel we will use the notation 1983/84 to denote stocks of assets as of the end of 1983 and beginning of 1984 and analogously for other years. When personal interviews were used the questionnaire was handed over to the head who was asked to write down his/her responses in privacy and return the questionnaire to the interviewer in a sealed envelope. When telephone interviews were used the same questionnaire was mailed to the head after the interview and the head was asked to return it by mail. By using the same instrument in collecting wealth data we do not believe that the choice of interview mode for the main interview (personal or telephone) much influenced the responses to the wealth questions.

Our wealth data are thus primarily based on the respondents own evaluation and responses. Market values of owner occupied houses, condominiums, secondary dwellings and other properties were estimated by the respondents. The same is true for consumer durables (except for the 1984 wave when a slightly more elaborate scheme was used). Financial assets are of four kinds: bank deposits; stocks, shares and bonds; private life insurance policies<sup>2</sup>; and private pension policies. To protect the respondent's privacy and to avoid partial nonresponse, bonds were not separated from stocks and shares.<sup>3</sup> For the same reason responses were only asked for in relatively broad intervals. The questionnaires separated between mortgages on owner occupied homes and other liabilities. In both cases we used the respondent's estimates.

The main principle of the household definition is that the household should constitute an economic unit. This means, among other things, that household members usually have the same residence, that they have some form of shared housekeeping and spend a certain amount of time together. This implies, for instance that parents and adult children who live with their parents form one joint household. The wealth concept used through out this study is the total household wealth and not per capita wealth or wealth per equivalent adult.

A disadvantage of the HUS-survey is that it does not cover the very old households. The sampling frame only included individuals below the age of 75. It is not evident how this will influence measures of the inequality of wealth. Among the very old are both poor households and households with large fortunes. One might guess that the inequality of wealth would increase a little if these households had been included.

Nonresponse is almost always a problem with survey data and in particular when the survey includes such sensitive issues as the respondent's assets and liabilities, and the HUS surveys are no exceptions. In all we have data for 2305 households which participated in at least one survey wave. Data were missing and imputed for at least one variable and for at least one year in 59.2 per cent of these cases, i.e. there are complete data for only 40.8 per cent of all households. The share of imputations varied from 3.2 per cent for Secondary dwellings and other real estate in 1983/84 to 31.7 per cent for Owner occupied housing in 1992/93. For most variables the share of imputations increased over time, perhaps indicating a little deterioration in data quality.<sup>4</sup> To compensate for missing data the multiple imputation technique suggested by Rubin(1987) was used. (For additional details see Appendix!)

*The HINK-surveys of Statistics Sweden*

A second source of household wealth data is the HINK survey administered by Statistics Sweden. This is an annual survey which started in the end of the 1970's and it is based on random samples from the population of all noninstitutionalized Swedish households. The sample sizes of the 1983, 1985 and 1992 waves were as large as 9584, 9508 and 12484 households respectively. Most data were obtained from self-reported tax returns which were supplemented with survey data covering socio-demographic information, labor market experience etc not included in the tax files. In each year stocks of assets were registered as of December 31.

The reliance on tax data has advantages as well as disadvantages. Some assets are very accurately reported, for instance listed shares and bank deposits. All banks and stock market brokers nowadays report all holdings and transactions of their customers directly to the tax authorities. So called lottery bonds are, however, not covered by this information network and the value of this asset is likely to be underreported in HINK. Data on liabilities are of relatively good quality because taxpayers have incentives to report them and claim deductions for interest paid.<sup>5</sup>

Ownership of real estate is well reported in HINK while the value of a property is obtained as the product of its tax assessed value multiplied by a regional estimate of the ratio of the average market value and the average tax assessed value. These estimates are likely to be good estimates of average market values but if house prices develop differently in different segments of the market then the tails of the distributions will become incorrectly estimated (see below).

For condominiums and other types of cooperative forms of ownership the HINK data are not as good. The value of a condominium declared for taxation has usually very little relation to the corresponding market value. In many cases the mortgages on the whole apartment complex exceed the tax assessed value and then the value of a condominium is set to zero although its market value might be substantial. Further more, there are no regional coefficients which could be used to adjust the declared values to market values. The result is thus that the HINK surveys seriously underestimate this type of asset. About 10 per cent of all households live in condominiums, most of them in the major cities.

The quality of data for consumer durables is also very poor. Tax payers only have to declare certain items like cars, pleasure boats, jewelry, antiques, paintings and other arts, but there are problems with severe underreporting, and other consumption capital goods like

appliances, electronic equipment, furniture, sports equipment etc are not reported for taxation at all.

Life insurance policies are included to the extent they are declared for wealth taxation, but private individual pension rights and future public and collective pension rights are not.

The HINK data, as well as any other data source including HUS, provide an incomplete picture of assets and inventories associated with unincorporated business. There are problems with their valuation and to determine what assets should be part of household wealth rather than belong to the business sector.

A major disadvantage of the HINK data is the household definition used. Adults (18 years of age or older) who live in the same household without being married or cohabiting are registered as separate households. This implies, for instance that parents and adult children who live with their parents are considered separate households. Analogously, if an old mother or father lives with a child. This is not unimportant. About 15 per cent of all households are of this type<sup>6</sup>. Compared to a more conventional household definition the definition used in the HINK survey is likely to increase the inequality of wealth. The survey will register an excessive number of households with no or very little wealth.

#### *A comparison between HUS and HINK*

The HUS and HINK estimates of wealth components were compared in Bager-Sjögren & Klevmarken (1993, 1995). As expected these comparisons showed differences which at least in part could be traced to the differences in population coverage, household definition and in evaluation of values. The smaller size of HUS also makes this survey more vulnerable to single observations in the right tail of the wealth distribution. For instance, the share of households who own their home is estimated to 52-53 per cent in HUS but only to 42-44 per cent in HINK. The lower share in the HINK survey is at least partly a result of the difference in household definition. Adults who live with someone else without being married or cohabiting are in HINK registered as separate nonowning households. Another possible partial explanation is that condominiums are underreported in the self assessments. A taxpayer who should declare a value of zero for his condominium might as well not report it at all. A third explanation is the difference in population coverage. HUS does not include the very old households, of which relatively few live in owner occupied houses.

In 1983/84 and 1985/86 the HUS estimates of the mean value of owner occupied houses were a little higher than the HINK estimates but in 1992/93 they were much smaller. Part of

the differences could be ascribed to random variation and probably also to the differences in the evaluation of market values. Large, expensive houses have increased less in value than small and medium sized houses. When average purchase coefficients are used in HINK to raise tax assessed values to market values, the increase in value has been overestimated for the most expensive houses. The HINK estimates at the 90th percentile are thus probably exaggerated. The direction of change is, however, the same in both data sources: a decrease in value between 1983/84 and 1985/86 and then an increase.

The share of owners of secondary dwellings and other real estate is also a little higher in HUS compared to HINK. The most likely explanation is again the difference in household definition. The mean value of this type of assets for those households who own it is much higher in HUS than in HINK for all three years. Because this group of assets includes both fram property and apartment complexes owned by households there are severe difficulties in getting reliable estimates in both surveys. For instance, if the sample would happen to include a family owning a few apartment complexes one year but not another year, then the difference in means might become severely influenced. The HINK surveys also had special problems in estimating the market value of these two assets in the years 1990-1992 due to the tax reform and changed data collection routines.<sup>7</sup> There is a relatively large increase in the HUS estimate 1985/86 - 1992/93 mostly due to one extreme value. If it is deleted the mean for 1992/93 drops by 23 per cent! Both data sources, however, show an increase in this wealth component.

The mean and the median values of bank deposits are very close for the first two years but the HUS gives a higher estimate for 1992/93. The differences are larger in the 90th percentile. For stocks and bonds there are also differences in estimates which are hard to explain, in particular the low estimate for 1992/93 in HINK.

The share of households with liabilities is marginally higher in HINK which is as expected because tax payers have incentives to report their debts to the tax authorities. There are also differences in value estimates. HUS suggests that the real value of the liabilities of Swedish households remained approximately constant between 1983/84 and 1985/86 and then declined. In particular households with large liabilities would have decreased them. The HINK data rather suggest an increase in liabilities and in particular in the right tail of the distribution!<sup>8</sup>

### **3. Total wealth and its components**

Using HINK data which give more frequent estimates than HUS data, the estimates of net wealth in constant prices show a decline from the end of the 1970s to the mid 1980s and then

an increase until 1991 and after that again a decrease. For the periods at focus here 1983-1992 and 1985-1992, net wealth per household increased by 28 per cent and 21 per cent respectively. The shares of owner occupied houses and secondary dwellings reached a peak in 1991 and then decreased marginally. The share of financial assets reached its peak already in 1988.<sup>9</sup>

Now turning to HUS data, with only three time-points we will not be able to distinguish the peak in net wealth in 1991, but only the net increase in the periods 1983-1992 and 1985-1992. Tables 1 and 2 use the full information in the HUS surveys, i.e. including condominiums, individual private life- and pension policies and consumer durables. The total wealth concept based on these components is called "extended wealth", as compared to the more limited definition of wealth used in the HINK. However, it does not include public and union related pension rights, nor human capital. The first table gives estimates of gross and net extended wealth and its components in constant 1985 prices for all households and for those who have assets. In the decade covered by the survey Swedish households have increased their net wealth by some 40 per cent, and by the end of the period the mean net extended wealth exceeds half a million crowns.<sup>1011</sup> This increase in net extended wealth is the result of a reduction in household debts and of an increase in all components of wealth except for owner occupied housing and consumer durables. The share of owner occupied housing and consumer durables of gross extended wealth has thus decreased. HUS data thus show a weaker growth in the value of owner occupied houses than the HINK surveys do. For the reasons already mentioned in section 2 HINK might exaggerate the increase in the market value of this asset. As owner occupied homes and consumer durables are the dominating assets in the portfolio of most households but the richest, these changes should have increased the inequality of the distribution of wealth. Households have reallocated their wealth primarily to bank deposits, private pension policies, and possibly to secondary dwellings and other real estate (note however the uncertainty of these estimates as shown by the standard errors in the last three columns of Table 1), and they have reduced their liabilities.

As shown by Table 2 most of these changes have taken place in the upper part of the wealth distribution. The table shows means and portfolio shares of gross extended wealth for a few deciles of net extended wealth. The share of owner occupied housing is smaller the richer the household and it has also decreased most for the richest. This is probably a result of a more rapid price decline on big, expensive houses compared to smaller houses. The share of consumer durables is also smaller in the upper part of the distribution but it has decreased even



further. The top decile has also reduced its share of stocks and bonds. Wealthy households have primarily increased their share of secondary dwellings and other real estate and reduced their liabilities.<sup>12</sup> The average increase in bank deposits noted in Table 1 is primarily traced to the middle of the wealth distribution while the households in the top decile actually decreased their share. Almost by definition the debt ratios are highest for the least wealthy households, but it is interesting to note that they have increased their ratio while other households have decreased their.<sup>13</sup>

The net result of all these changes is that net extended wealth has increased most in absolute and relative terms for the most wealthy households while the lowest decile has increased its debts.

These changes should be related to the major changes in the Swedish economy already summarized in the introduction. The shares of each asset held by Swedish households was influenced by changing asset prices and by new incentives to hold assets given by the new tax system. Real estate prices peaked in the beginning of the 1990s and the subsequent fall was enforced by the new tax system. The decrease in marginal tax rates decreased the value of deductions, the most important being interest payments on mortgages, the old tax on imputed incomes from housing was replaced by a flat rate real estate tax with the tax assessed value of the property as a base. The tax on capital gains from owner occupied houses also changed. In all the new tax system implied higher taxes on owner occupied homes. More or less consistent with these changes is the observed no change 1985-1992 in investments in owner occupied homes. The old tax system combined with high inflation gave incentives to finance purchases of real estate and consumer durables by mortgages and loans and the debt ratio was relatively high in the middle of the 1980s. The new tax system made liabilities relatively more expensive and at the same time inflation started to decrease. Uncertainty about future incomes (increasing unemployment) and about the future pension system contributed to the observed decrease in household debts in the end of the period. Because consumption credits also became relatively more expensive the share of consumer durables was also decreased.

The new tax system made the taxation of bank deposits and bonds more equal to that of other assets. As a result the share of bank deposits and bonds have increased. Although the taxes on private investments in pension funds were increased this kind of asset still had a favour relative to alternatives. The increased uncertainty about the future of the public pension system also contributed to the increasing interest in private pension policies.

It is of course very difficult to separate out the effects of the tax reform from alternative explanations. Supplementary information from the HUS surveys on respondents self-evaluated responses to the tax changes is suggestive. Almost 29 per cent of all respondents believed that the tax reform made them decrease their debt while close to 13 per cent thought that they had increased their debt as a result of the tax reform. The responses depended on the size of household net wealth in 1992. Among the 25 per cent most wealthy 39 per cent said they had decreased their debts and 7 per cent that they had increased them, while in the least wealthy quartile only about 25 per cent said they had decreased their debts and 23 per cent that they had increased them.

There were also questions about savings behavior. Almost 38 per cent of the respondents said that the tax reform made them save more, men more than women and well educated more than respondents with a shorter schooling. Savings behavior is related to the size of disposable income, and so were the responses to these questions. More than 52 per cent of the respondents in the highest income quartile said that they saved more while only 26 per cent in the lowest quartile gave this response. The decreased share of debts in the portfolio of households could thus be the combined effect of reallocations within the portfolio and increased net savings.

#### **4. The inequality of wealth**

Table 3 compares three different inequality measures computed for both data sources. To preserve comparability between the two data sets the definitions of gross and net wealth are the more limited ones excluding consumer durables and condominiums. A first observation is that all the HINK data measures of inequality are higher than those using HUS data. The difference is particularly large for the relative interquartile range. The most important explanation is that the difference in household definition makes the interquartile range wider and the median wealth smaller in HINK and a wider interquartile range is thus divided by a smaller number. The difference in household definition is likely to influence the other two measures in the same direction. It is also likely that the difference in population coverage, the very old are not included in HUS, contributes to the differences in inequality. Please note that the sampling and measurement errors which are likely to be larger in the smaller HUS survey will work in the opposite direction, i.e. tend to inflate the inequality measures of HUS more than those of HINK.

One may also note both that the coefficient of variation is more sensitive to the tails of the distribution than the two other measures as evidenced by the relatively large standard errors, and that the inequality of net wealth is higher than that of gross wealth. The very unequal distribution of liabilities explains the latter result.

The three measures do not give the same picture of changes in inequality during the period of observation. The measures more sensitive to the tails of the distribution, the coefficient of variation and the Gini coefficient indicate an increase in the inequality of net wealth, while the relative interquartile range shows no increase or even a decrease. Any increase in inequality should thus come from the extreme tails of the distribution.<sup>14</sup> The standard errors of the estimates indicate, however that these changes are insignificant. Only the increase in the Gini coefficient for Hink data will pass a significance test. (The large value of the Gini coefficient for net wealth from HUS data in 1985/86 is the result of an outlier with a large debt. The corresponding estimate for gross wealth does not give the same peak.) Both data sources show that the changes in inequality of gross wealth are smaller than those for net wealth. The relative interquartile range decreases while the other two measures either increase a little or remain approximately constant. Most of the changes in inequality of net wealth would thus seem to come from the changes in household debts. The same conclusion is reached if a longer and more frequent series of Gini coefficients from the HINK surveys are used. There is no trend in the inequality of gross wealth while the Gini coefficients for net wealth start to increase in the beginning of the 1990s. If wealthy households decreased their liabilities relatively more than poor households the inequality of net wealth should increase more than the inequality of gross wealth.

Bager-Sjögren & Klevmarken (1993) demonstrated that the measures of inequality are very sensitive to the definition of household wealth. If owner occupied houses and condominiums are valued at market prices and if the wealth invested in consumer durables are included, the inequality measures drops considerably. The same result is found if the inequality measures of Table 4 using the extended wealth definition are compared to the measures of Table 3. For instance, the Gini coefficient for the extended net wealth concept is about 70 per cent of the Gini for the more limited wealth definition.

The inequality measures of extended wealth give a somewhat different picture of the changes in inequality compared to the measures of the limited concept. The inequality of net wealth shows a modest increase from the beginning of the 1980's to the beginning of the 1990's. The Gini coefficient and the relative interquartile range increased by about 10 per cent

while the coefficient of variation doubled. The standard errors of the latter measure are, however, very large. (The measures for 1985/86 are still influenced by the outlier mentioned above although its influence is now more smoothed out.) A major difference compared to the previous table is that the inequality of gross wealth increased about as much as the inequality of net wealth. There is thus no longer any indication that the changes in household debt drove the changes in the inequality of net wealth.

The same table also details each asset share of gross extended wealth and the corresponding concentration coefficients. Consumer durables and bank deposits are the assets least concentrated to the wealthy while stocks and other financial assets and secondary dwellings and other real estate, and pension policies are the most concentrated. Owner occupied houses have a concentration in between.

As the share of secondary dwellings and other real estate has increased so has the concentration coefficient, indicating that investments in this asset have primarily been done by the wealthy. As a contrast, investments in pension policies and stocks and bonds have become less concentrated to the wealthy.

Following Podder(1993) the last panel of Table 4 details the effects of changes in the components of wealth on the inequality of gross extended wealth by measures of elasticities of the Gini coefficient with respect to the components of gross wealth.<sup>15</sup> For instance, the elasticity of the Gini coefficient with respect to Secondary dwellings and other real estate was 0.13 in 1992/93, i.e. a 10 per cent proportional increase in this asset would increase the Gini with 1.3 per cent.<sup>16</sup> The results show that increases in the assets Secondary dwellings and other real estate and Stocks and bonds will increase the inequality in wealth, while increasing bank deposits and investments in consumer durables will decrease inequality. Changes in the latter asset, which is relatively evenly distributed among all households, have the strongest equalizing effect.

The estimated elasticities are not constant. For Secondary dwellings and other real estate the estimates increased more than four times in the period of observation. This is still another way to demonstrate that this asset has become more unevenly distributed. For Owner occupied housing and for Stocks and bonds the changes in elasticities go in the opposite direction. In the beginning of the 1980's an increase in the wealth endowed in owner occupied housing would have increased inequality while ten years later it would result in a decrease. Increased investments in Stocks and bonds still increase inequality but to a much lesser degree today than in the beginning of the 1980's. This is consistent with other information about a more

widespread ownership of stocks and bonds, in particular through various types of investment funds.

### **5. A multivariate analysis of changes 1985/86 - 1992/93 in net extended wealth**

We have already noted that HINK data show a cyclical pattern in mean net wealth with a trough in the mid 1980s and a peak in 1991. Using our more general definition of household wealth we have found that the mean net extended wealth in constant prices increased from the end of 1985 to the end of 1992, and that wealthy households have increased their wealth more than less wealthy. The mean increased by 238 000 crowns 1985/86-1992/93 in the 1985 price level (Rubin's standard error was 46 000) while the median only increased by 4 000 crowns. The percentiles demonstrate a considerable variability of the distribution of change. The 10th percentile decreased by 116 000 and the 90th percentile increased by 121 000. Behind these numbers thus lie very different experiences of the Swedish households. Which households increased their wealth and which households decreased their? Guidance to an answer to this question is obtained from Table 5 which displays the result from a heteroskedasticity corrected regression of the changes in log net extended wealth on a set of explanatory variables.<sup>17</sup>

A life-cycle interpretation of the accumulation of wealth gets a weak support. Households with a head in the upper middle ages tend to increase their wealth more than other households. There are no significant differences between the various family types. Education is important. Those who have a head with a higher education increased their wealth more compared to other households. There is also a very weak indication that a change in the number of bread winners is of some importance.

Households who have invested a large share of their wealth in their own home have taken advantage of the increased real estate prices and increased their wealth more than those who rented an apartment. There were, however, no significant effect of having a secondary dwelling or other real estate. An explanation is that this is a rather heterogeneous group of assets the prices of which probably developed rather differently. Households which had a large debt ratio in 1985/86 increased their wealth less than average and the same is true for those who started with a large wealth relative to their disposable income. Finally, we also note that the more a household increased its income the more wealth did it accumulate.

## **6. The mobility of wealth 1985/86 - 1992/93**

### *A review of the empirical literature*

To analyze the mobility of wealth one does not only have the usual difficulties of getting good wealth data, but repeated measurements on the same individuals or households are also needed. There are thus relatively few studies of the mobility of wealth. The study by Menchik(1979) on inter-generational wealth mobility is a relatively early one. He used a small sample of wealthy Connecticut residents who died in the 1930s and 1940s. Mobility was analysed by a regression of the logarithm of terminal wealth of the child, on what he called the logarithm of peak midparent wealth and a few control variables. He found a 30 per cent regression towards the mean and a partial correlation coefficient of 0.48 as a measure of inter-generational (im)mobility. Steckel(1990) was probably one of the first to use national longitudinal household data. He matched U.S. census data on real estate wealth from 1850 and 1860 for 1581 male-headed households. Using a transition matrix he found, for instance (p. 277), that among those with zero real estate in 1950, about 48 per cent also had zero real estate in 1860 but nearly 30 per cent made it to the fifth decile or beyond. Among those in the top decile in 1850 46.2 per cent remained in that position while 11.5 per cent fell below the fifth decile in 1860. In the middle of the distribution mobility was relatively greater. Shorrocks' measure of mobility was computed to 0.605.<sup>18</sup> Steckel also analysed the change in the percentile position by an ordinary least-squares regression using as explanatory variables the age of the head, number of children less than 10 and greater than or equal to 10 in 1850 and 1860, ethnicity, changes in occupation and changes in region. Among his results were that the advancement towards more wealth declined by age. Illiterate and blacks added relatively less to wealth, while the number of children and their age composition were insignificant. Those who continued as unskilled and blue collar workers declined relative to those who remained farmers or white-collar workers.

The same kind of study was later repeated by Steckel & Krishnan(1992), but now using the sub samples of older men and mature women of the National Longitudinal Survey from the mid 1960s to the mid 1970s. Their measure of wealth included real property in houses or farms, business assets, other property and financial assets less personal loans and other liabilities. It did not include pension or annuity wealth, nor automobiles. A transition matrix showed that 67 per cent of those who were in the two lowest deciles in the beginning of the period remained there at the end. 58.4 per cent of those who were in the 10th decile remained there. Those who moved from the bottom or from the top of the wealth distribution generally

did not move very far. The Shorrocks measure was 0.773. Steckel also found that the greatest absolute but smallest relative gains occurred for those who were wealthy in the beginning of the period and that the smallest absolute and greatest relative gains occurred among the least wealthy. The change in percentile regression showed a negative effect of increasing age of the head, a significantly positive effect of more than 12 years of schooling, and persistent residence in the south increased the household's relative position compared to those who moved or stayed out of the south. Marital history had a major impact on mobility. People who remained single declined in relative position and so did those who divorced or became widowed. The decline was particularly strong for women. Occupational history also influenced mobility. For instance, persistent farmers and blue collar workers who changed to a white collar job increased their relative position.<sup>19</sup>

The mobility in the bottom and in the top of the wealth distribution was analyzed separately using logit models. This analysis showed that age had no effect on persistence or movements into the bottom while the number of dependents, being black, having less than 12 years of schooling, being persistently single and becoming divorced or widowed increased the probability both to remain in the bottom and to move into the bottom. Families with an old head had a higher probability to remain in the top of the wealth distribution. Being nonblack, having more than 12 years of schooling, not being single or becoming divorced or widowed also increased the probability. The same characteristics also increased the probability to move into the top except for the age variable which was insignificant. The number of dependents had a negative effect on this probability but no significant effect on the probability to remain in the top.

An even more recent study is Hurst et al (1996) using the PSID for the period 1984-1994. In this case the wealth measure included real estate, farm or business assets, financial assets including life insurance policies and accumulation of pensions, vehicles, and less debts. A transition matrix shows that 58.9 per cent of those who were in the first two deciles in 1984 remained there in 1994, and 53.3 per cent remained in the top decile. These estimates are a little lower than in Steckel & Krishnan(1992). The Shorrocks measure computed from the transition matrix is 0.80. The over all mobility is thus only marginally higher than that observed by Steckel & Krishnan(1992). There are also probit estimates of staying in the bottom decile 1984-1989 and of falling into the bottom decile. The results show that the age of the head and marital status have no significant effect on the probability to stay while increasing incomes, both permanent and transitory, decrease the probability. The probability to fall into the bottom

decile decreased with increasing age of the head and increasing (permanent) income, while it was high for persistently single and for those who changed marital status compared to those who were persistently nonsingle.

Finally we will also review a few results from a European study, Bentzen & Schmidt-Sørensen(1994) using Danish data for the period 1983-1990. Their wealth data originated from amounts declared to the tax authorities and included real estate and financial assets less liabilities, but not pension or annuity wealth. The transition matrix from this study shows that only 42.5 per cent of those who were in the two bottom deciles in 1983 remained there in 1990, while 68 per cent of those who were in the top decile remained there. The corresponding Shorrocks measure was 0.78. Compared to the two modern time U.S. studies the Danish distribution of wealth is thus more mobile in the bottom and less mobile in the top, while Shorrocks over all mobility measure is about the same. The U.S. data included both the white and nonwhite populations and it is conceivable that a transition matrix for whites only would have shown a higher mobility in the bottom of the distribution more similar to the Danish.

A comparison of the average decile position in 1983 and 1990 by various sub groups of the sample shows, for instance, that those who were youngest in 1983 lost in relative position. Self-employed, managers and salaried employees in leading positions increased their relative wealth ranking. House owners also made major gains as did those who had more than 12 years of schooling. Being or becoming single decreased the average wealth percentile.

It is of course difficult to compare across these studies as they use data which have been collected in different ways for slightly different populations and not using exactly the same definitions of net wealth. However, a few general observations can be made. Wealth mobility depends on the position in the life-cycle. Except possibly for the very young, young and middle aged increase their wealth relatively rapidly. Those who have a higher education and get managerial and similar white-collar jobs also increase their relative wealth position. Marital status and changes in marital status are important. Singles have a disadvantage and becoming divorced or widowed decreases the ranking. Finally we might also note that the portfolio composition is important. The Danish study is an example of the importance of having assets which increase in value relative to other assets, in this case of owning a home.



### *The mobility of wealth in Sweden*

In this section we take advantage of the panel properties of the HUS data and analyze the mobility of wealth 1985/86 - 1992/93. First, a simple transition matrix is computed and compared to the studies reviewed above and then the mobility in decile ranks is analyzed in a multivariate approach.

Table 6 is a transition matrix, which gives the estimated probability to leave a given net wealth decile in 1985/86 for another decile of net wealth in 1992/93. For instance, the probability to go from the first to the second decile is estimated to 13 per cent. The diagonal elements give the probabilities to remain in the same decile. For each row the estimates thus sum to 100.

The probability to remain in the same decile ranges from 9 per cent to 52 per cent with the highest estimates in both ends of the wealth distribution. Mobility is thus much higher in the middle of the distribution than in the ends, or to put it differently, the probability to remain poor or wealthy is higher than the probability to keep an average wealth. The 47 per cent which remained in the two bottom deciles is smaller than in the U.S studies and only marginally higher than in the Danish study. The mobility in the top, 52 per cent remained in the top, is about the same as in the U.S. study based on the PSID, but higher than in Denmark. The Shorrocks measure is higher than in any of the other studies, 0.87.<sup>20</sup> In these comparisons one has to bear in mind that the time periods covered are of different lengths. The two modern time U.S. studies covered ten years periods while the Danish and Swedish studies covered seven years periods. If the Scandinavian studies had also covered ten years it is likely that they had shown an even higher mobility. With the reservation that the data sets are not fully comparable we conclude that wealth mobility is higher in Sweden than in the two other countries.

To analyze who is gaining in decile rank and who is losing a multinomial model was estimated. The categorical dependent variable takes three values: decrease in decile rank, no change and increase in decile rank. The first group is the comparison group. The bottom and top deciles were dropped from the analysis because households in these two deciles can obviously only move in one direction. The mobility of these two deciles were analyzed in two separate logit analyses. The degree of mobility is obviously state dependent, cf Table 6, and for this reason dummy variables for the deciles 2-4 and 6-9 were included in the model. Decile 5 is the decile of reference. Our sample includes both stable households and households which have experienced marriages, separations, the death of a spouse and other changes in their composition. Some of these changes may greatly influence the wealth of a household. With the

current definition of a household, those who live jointly with a designated head<sup>21</sup>, a separation may reduce the wealth of the head's household by half. The main rule at a separation is that the wealth of the household is split equally between the separating spouses. To control for these changes in the composition of the household a few dummy variables for family type and changes in marital status were introduced. In addition the model includes dummy variables for: age group in 1986, the schooling of the head in 1986, if the household in 1986 had a secondary dwelling or other real estate, if it lived in an owner occupied home, and if it in 1986 had liabilities.

The parameter estimates are presented in Table 7 and predicted shares in Table 8. The model does a decent but not a very good job in predicting the observed outcome. The state dependencies comes out clearly in the estimates. The probability to advance in rank or remain in the same decile is relatively higher in the bottom deciles and lower in the top deciles. Households which experienced a separation or the death of a spouse have a high probability of losing in rank. Those who persistently had single heads were also more likely to lose in rank than to gain, and if these single heads had children their probability to lose was even higher. These results are consistent both with prior expectations and with previous results. The importance of separations to explain mobility and the relatively high separation rates in Sweden might contribute to the explanation of the difference in overall mobility between Sweden and the United States.

Households in the age bracket 55-64 years have a relatively high probability to gain in decile rank or at least not to lose in rank. This is consistent with a decreasing obligation to provide for children in this age bracket, with both spouses working in the market and with amortized mortgages. Very young households and retirees are on the other hand not likely to gain in rank. Schooling significantly influence the relative probability to increase in decile rank. Households with a head who has a college or university education has a higher probability to increase in rank than households with less schooling.

The household's portfolio position in 1985/86 significantly influenced its chances to advance in rank. Households with an owner occupied home, with a secondary dwelling or other real estate and households with liabilities all had higher probabilities to increase their decile rank. The marginal effects on the three probabilities are shown in Table 9. For instance, the probability to lose in rank is 0.21 less for a household with an owner occupied home than for a household without one and the probability to gain in rank is 0.19 higher. The value of owner occupied homes have obviously increased so much that the wealth of owners have

increased significantly. The marginal effect of secondary dwellings and other real estates is similar but on average not as high. One interpretation of the positive marginal effect of liabilities in 1985/86 is that the tax reforms have given households sufficient incentives to reduce their debts and thus advance i decile rank. Another interpretation is that the relatively high inflation in the second half of the 1980's has reduced the real value of liabilities.

The estimates of two logit models, one for the probability to advance from the lowest decile and one for the probability to leave the highest decile, are presented in Table 10. They show that households with a head above 64 years of age, i e in most cases a retired head, have a higher probability to leave the bottom decile than all other households. For this group of households retirement might mean both a regular pension income and a need for less expenses, and thus an opportunity to reduce their liabilities. The positive effect of liabilities with a P-value of 0.07 supports this interpretation. Also for households in the bottom decile the probability to advance is positively related to having an owner occupied home. The marginal effect is relatively large, on average 16 per cent of the point estimate, i e about 0.7! At conventional levels all estimates of the model for the probability to leave the 10th decile are insignificant and the model does not do a very good job in predicting these transitions. We thus have to conclude either that the sample is too small to give significant effects or that the probability to leave the top decile has explanations different from mobility in the rest of the wealth distribution.

## 7. Conclusions

From the beginning of the 1980's to the beginning of the 1990's household extended wealth increased by about 40 per cent in real terms and the mean wealth of a Swedish household exceeded half a million crowns at the end of the period. More recent data indicate though a decline in average household wealth. Behind these figures we have found major changes both in the portfolio composition and in the inequality of wealth which can be related to market and policy changes which have taken place in this period.

Considering the whole period we have found that Swedish households have decreased their liabilities and increased their assets in primarily bank deposits, private pensions and secondary dwellings. The wealth invested in owner occupied homes decreased in value in the first half of the period and increased in the second. According to our estimates the mean real value of owner occupied housing was about the same in the beginning and the end of the period. Other sources suggest that behind the average increase 1985/86-1992/93 lay first a

major increase in the house prices until 1991 and then a drop after the tax reform and in the subsequent recession.

These changes in the distribution of wealth are consistent with what we know about price changes on assets and the predicted consequences of the tax reform. As predicted, liabilities and the value of consumer durables have decreased and the holdings of bank deposits have increased. The value of real estate was predicted to decrease as a result of the tax reform, and HINK-data suggest that they have decreased after 1991, but the observed changes have also been influenced by the volatile price changes in the real estate markets unrelated to the tax reform and it is difficult to isolate the effects of the tax reform.

The largest changes in portfolio composition has occurred among the most wealthy and they have also increased their wealth relatively more than the less wealthy. As a result the inequality of the wealth distribution has increased. Inequality estimates are sensitive both to the definition of wealth and to the particular inequality index. Our data suggest that the Gini coefficient for extended wealth has increased by some 10 per cent.

The increase in inequality is also a result of the change in portfolio composition. The increased investments, in secondary dwellings and other real estate, private pension policies and in stocks and bonds, have increased inequality. The decreased investments in consumer durables worked in the same direction as well as the shift in the debt burden from the wealthy to the less wealthy. The only change which decreased inequality was the increase in bank deposits.

The decrease in the value of owner occupied housing in the beginning of the period probably contributed, but only marginally, to an increase in inequality, but at the end of the period the same increase would have resulted in a small decrease in inequality. Taken over the whole period the changes in the value of owner occupied houses probably did not effect inequality much, but the decrease in housing values which followed the tax reform should have contributed to the increase in inequality. Additional effects of the tax reform on the distribution of wealth are not so easy to distinguish. Pure portfolio reallocations should not immediately influence net wealth. Only differential changes in the return on assets will after some time change the distribution of net wealth.

The subjective responses to the tax reform summarized in section 3 of this paper indicated that the reform had increased savings and reduced liabilities, and our analysis of changes in wealth showed that increases in incomes increased wealth. The increase in disposable income which was the combined effect of tax and transfer changes for many

households could thus have contributed to a reduction in liabilities and an increased accumulation of wealth, changes which primarily took place in the upper half of the wealth distribution.

These results are supported and further detailed by our analysis of the mobility of wealth. Households who owned real estate and had liabilities in the middle of the 1980's had a higher chance than other households to increase their rank in the wealth distribution.

Studies of mobility of wealth are rather few, but comparing our results with a few results from the United States and Denmark indicated that mobility is relatively high in Sweden. This result might seem counter intuitive, because allegedly the United States is a country in which the self-made man can advance from nothing into wealth, while taxation would make this much more difficult in Sweden. However, mobility is measured relative to the inequality of wealth in each country. The greater inequality of wealth in the United States implies that a move of one decile in this country is a longer move than a decile in Sweden. If the distance of a move had been measured in an absolute sense mobility might have turned out higher in the United States. Another interpretation is that the nonwhite population in the United States have relatively little wealth and low mobility compared to the white population, while there is no such subpopulation in Sweden. A third explanation, supported by our analysis but still somewhat speculative is that the relatively high separation rates in Sweden explain at least part of the differences in mobility between the two countries.

Additional results which agree well with those of previous studies are that mobility up the distribution primarily takes place among middle aged and among those with a university education.

## References

- Bager-Sjögren L. and Klevmarken N. A. "The Distribution of Wealth in Sweden 1984 -1986" in Research in Economic Inequality, Vol. 4. pp 203-224, Greenwich: JAI Press, 1993
- Bager-Sjögren, L. and Klevmarken, N.A., "Inequality and mobility of wealth in Sweden 1983/84 - 1992/93", Tax Reform Evaluation Report No 21, November 1995, National institute of Economic research, Stockholm, 1995
- Bentzen J. and Schmidt-Sörensen, "Wealth Distribution and Mobility in Denmark: A Longitudinal Study" Working Paper 94-4, Centre for Labour Market and Social Research, University of Aarhus Aarhus School of Business, 1994
- Hurst, E., Ming Ching Luoh and Frank P. Stafford, "Wealth Dynamics of American Families, 1984-1994", Working Paper, Department of Economics and ISR, University of Michigan, Ann Arbor, 1996.
- Income Distribution Surveys (HINK), Statistiska meddelanden Series BE, Statistics Sweden, Örebro, annual
- Jansson, K. and S. Johansson, Förmögenhetsfördelningen 1975 - 1987. Stockholm: Statistiska Centralbyrån, 1988
- Kessler, D. and A. Masson, "Personal Wealth Distribution in France: Cross-sectional Evidence and Extensions.", in E.N. Wolff(ed.) International Comparisons of Household Wealth, Oxford: Clarendon, 1987
- Klevmarken N. A. and Olovsson P., Household Market and Nonmarket activities. Procedures and Codes 1984-1991 Stockholm: Almquist & Wiksell International/IUI, 1993
- Klevmarken N. A. and Olovsson P., "HUS codebook for the 1993 survey " mimeo, 1994
- Little R. J. A. and Rubin D. B., Statistical Analysis with Missing Data, New York: J Wiley, 1987
- Menchik, P.L., "Inter-generational Transmission of Inequality: An Empirical Study of Wealth Mobility" Economica, 46, 349-362, 1979
- Podder N., "The Disaggregation of the Gini Coefficient by Factor Components and its Applications to Australia", Review of Income and Wealth, Series 39, No 1, 1993
- Pålsson, A-M., "Household Risk Taking and Wealth: Does Risk Taking Matter?", Research in Economic Inequality, Vol. 4, pp 225-261, Greenwich: JAI Press, 1993
- Rubin D. B., Multiple Imputations for Nonresponse Surveys, New York: J Wiley, 1987
- Shorrocks, A.F., "The measure of mobility", Econometrica 46, 111-120, 1978

Spånt, R., "Den svenska förmögenhetsfördelningens utveckling". Löntagarna och kapitaltillväxten 2, SOU 1979:9, Allmänna Förlaget, 1979

Spånt, R., "The Wealth Distribution in Sweden: 1920-1983" in E.N. Wolff(ed.), International comparisons of the Distribution of Household Wealth, Clarendon Press, Oxford, 1987

Steckel, R.H., "Poverty and Prosperity: A Longitudinal Study of Wealth Accumulation, 1850-1860", The Review of Economics and Statistics, 72, 275-285, 1990

Steckel, R.H. and Krishnan, J., "Wealth mobility in America: A View from the National Longitudinal Survey" Working Paper no 4137, National Bureau of Economic Research, Cambridge, MA, 1992

**Table 1.** Mean extended net and gross wealth, shares of households holding assets and mean holdings. (All values are in thousands of SEK and in real prices dec -85=100. *Standard errors in italics.*)

	Means and shares of gross wealth all observations			Proportion of ownership			Means given ownership		
	83/84 %	85/86 %	92/93 %	83/84	85/86	92/93	83/84	85/86	92/93
Net extended wealth	412	411	598						
Gross extended wealth	539	574	722						
Owner occupied housing	236 0.44	211 0.37	237 0.33	0.61	0.61	0.61	385 <i>12</i>	347 <i>8</i>	388 <i>12</i>
Sec dwell & other real est	60 0.11	88 0.15	172 0.24	0.25	0.28	0.31	239 <i>17</i>	312 <i>60</i>	562 <i>112</i>
Life insurance policies *	-	6 0.01	7 0.01	-	0.14	0.14	-	43 <i>6</i>	55 <i>7</i>
Private pension policies*	-	8 0.01	24 0.03	-	0.14	0.33	-	54 <i>7</i>	72 <i>5</i>
Bank deposits**	38 0.07	45 0.08	75 0.1	1.00	1.00	1.00	38 <i>2</i>	45 <i>2</i>	75 <i>3</i>
Stocks & bonds**	40 0.07	36 0.06	48 0.07	1.00	1.00	1.00	39 <i>5</i>	36 <i>4</i>	48 <i>5</i>
Consumer durables**	166 0.31	179 0.31	159 0.22	1.00	1.00	1.00	166 <i>4</i>	179 <i>4</i>	159 <i>5</i>
Debts	127 0.23	163 0.28	124 0.17	0.70	0.76	0.74	182 <i>6</i>	213 <i>11</i>	168 <i>6</i>
Sample size	1505	1772	1150						

\* Component not observed for 1983/94

\*\* These assets are observed by intervals and zero holdings is included in the first interval.

Estimates are based on ten replications; owner occupied housing includes condominiums and other co-operatively owned apartments



**Table 2.** Means and portfolio shares in selected deciles for extended wealth\*.

Means of all observations	Lowest decile			Third decile			Fifth decile			Eighth decile			Top decile		
	83/84	85/86	92/93	83/84	85/86	92/93	83/84	85/86	92/93	83/84	85/86	92/93	83/84	85/86	92/93
Net extended wealth	-18	-188	-32	111	107	147	266	284	325	559	566	731	1415	1549	2546
Gross extended wealth	94	221	116	176	189	242	399	403	442	711	719	859	1637	1764	2717
Owner occupied housing	36	112	45	60	73	89	204	161	178	337	282	351	639	472	585
Sec dwell & other real est	4	18	2	5	10	13	37	30	29	60	74	111	298	509	1248
Life insurance policies	**	1	1	**	1	2	**	2	1	**	5	9	**	33	31
Private pension policies	**	2	1	**	1	2	**	2	8	**	5	30	**	48	110
Bank deposits	8	14	13	17	20	36	40	30	51	48	57	110	101	125	178
Stocks & bonds	2	16	4	8	7	8	13	11	17	22	33	36	262	215	260
Consumer durables	43	59	49	86	76	91	105	167	157	244	261	212	336	361	305
Debts	112	409	148	65	81	95	134	119	117	152	153	128	222	215	172
<b>Shares of gross extended wealth</b>															
	83/84	85/86	92/93	83/84	85/86	92/93	83/84	85/86	92/93	83/84	85/86	92/93	83/84	85/86	92/93
Owner occupied housing	38%	51%	39%	34%	39%	37%	51%	40%	40%	47%	39%	41%	39%	27%	22%
Sec dwell & other real est	5%	8%	2%	3%	5%	5%	9%	7%	7%	9%	10%	13%	18%	29%	46%
Life insurance policies		1%	1%		1%	1%		0%	0%		1%	1%		2%	1%
Private pension policies		1%	1%		1%	1%		1%	2%		1%	4%		3%	4%
Bank deposits	9%	6%	11%	10%	11%	15%	10%	8%	12%	7%	8%	13%	6%	7%	7%
Stocks & bonds	2%	7%	4%	4%	4%	3%	3%	3%	4%	3%	5%	4%	16%	12%	10%
Consumer durables	46%	27%	43%	49%	40%	38%	26%	41%	36%	34%	36%	25%	21%	20%	11%
Debts	120%	185%	128%	37%	43%	39%	33%	29%	26%	21%	21%	15%	14%	12%	6%

\*Estimates are based on ten replications of data.

\*\*Component not observed.

**Table 3.** Wealth inequality measures using HUS and HINK data.

	<b>83/84</b>	<b>85/86</b>	<b>92/93</b>
<i>Standard errors in italics*</i>			
<b>HUS</b>			
<i>Coefficient of variation</i>			
Net wealth	1.79	3.87	3.36
	<i>0.11</i>	<i>1.10</i>	<i>0.85</i>
Gross wealth	1.31	2.17	2.57
	<i>0.08</i>	<i>0.68</i>	<i>0.68</i>
<i>Gini coefficient</i>			
Net wealth	0.74	0.93	0.76
	<i>0.02</i>	<i>0.05</i>	<i>0.02</i>
Gross wealth	0.58	0.59	0.62
	<i>0.01</i>	<i>0.02</i>	<i>0.03</i>
<i>Relative interquartile range</i>			
Net wealth	2.71	2.90	2.58
Gross wealth	1.92	1.88	1.83
<b>HINK</b>			
<i>Coefficient of variation</i>			
Net wealth	2.18	2.47	2.90
	<i>0.12</i>	<i>0.20</i>	<i>0.34</i>
Gross wealth	2.02	2.42	2.01
	<i>0.22</i>	<i>0.27</i>	<i>0.21</i>
<i>Gini coefficient</i>			
Net wealth	0.85	0.88	0.92
	<i>0.02</i>	<i>0.02</i>	<i>0.01</i>
Gross wealth	0.69	0.68	0.68
	<i>0.01</i>	<i>0.01</i>	<i>0.00</i>
<i>Relative interquartile range</i>			
Net wealth	5.90	5.32	6.09
Gross wealth	5.13	4.52	4.73

\*The estimates from HUS are based on one replication of data (see section 2 and appendix).

Note: The limited definition of wealth excluding consumer durables etc. has been used for both data sources.

**Table 4.** Inequality, concentration and elasticity measures using HUS data and the extended wealth definition.*Standard error in italics\**

	83/84	85/86	92/93
<i>Coefficient of variation</i>			
Net wealth	1.14 <i>0.06</i>	2.06 <i>0.59</i>	2.25 <i>0.59</i>
Gross wealth	1.00 <i>0.05</i>	1.50 <i>0.42</i>	1.89 <i>0.50</i>
<i>Gini coefficient</i>			
Net wealth	0.52 <i>0.01</i>	0.59 <i>0.03</i>	0.58 <i>0.02</i>
Gross wealth	0.47 <i>0.01</i>	0.48 <i>0.02</i>	0.52 <i>0.02</i>
<i>Relative interquartile range</i>			
Net wealth	1.38	1.44	1.54
Gross wealth	1.39	1.31	1.30
<i>Share of total gross wealth (%)</i>			
Secondary dwelling & other real estate	11	15	24
Owner occupied housing	44	37	33
Life insurance policies	**	1	1
Private pension policies	**	2	3
Bank deposits	7	8	10
Stocks and bonds	7	6	7
Consumer durables	31	31	22
Gross wealth	100	100	100
<i>Concentration coefficient</i>			
Secondary dwelling & other real estate	0.60	0.70	0.80
Owner occupied housing	0.51	0.49	0.49
Life insurance policies	**	0.48	0.52
Private pension policies	**	0.82	0.68
Bank deposits	0.34	0.36	0.32
Stocks and bonds	0.72	0.71	0.60
Consumer durables	0.33	0.33	0.28
<i>Elasticity of GINI coefficient with respect to component</i>			
Secondary dwelling & other real estate	0.03	0.07	0.13
Owner occupied housing	0.04	0.01	-0.02
Life insurance policies	**	0.00	0.00
Private pension policies	**	0.01	0.01
Bank deposits	-0.02	-0.02	-0.04
Stocks and bonds	0.04	0.03	0.01
Consumer durables	-0.09	-0.10	-0.10

\*These estimates are based on one replication of HUS data.

\*\*Component not observed.

**Table 5.** Parameter estimates from a weighted regression explaining the change 1984/85 - 1992/93 in the log of net extended wealth.

<b>Independent variables</b>	<b>Coefficient</b>	<b>Std.Err</b>	<b>P&gt; t </b>
<u>Age of household head</u>			
35-54	0.0664	0.0849	0.3021
55-64	0.1461	0.0970	0.0924
65 and above	-0.0330	0.1111	0.5326
<u>Family type</u>			
Single adult with children	-0.2368	0.3099	0.3090
Two adults without children	-0.0550	0.1063	0.4201
Two adults with children	0.0850	0.1144	0.3153
<u>Schooling</u>			
10 to 12 years	-0.0587	0.0681	0.2701
More than 12 years	0.1518	0.0625	0.0160
Value of sec. dwellings and other real estate as a share of gross wealth	0.0013	0.0016	0.3111
Value of owner occupied home as a share of gross wealth	0.0057	0.0015	0.0000
Liabilities as a share of gross wealth -85	-0.0030	0.0021	0.0993
Log of ratio: Wealth -85/disposable income -85	-0.3787	0.0356	0.0000
Change in the log of disposable income	0.2900	0.0493	0.0000
Change in no of employed adults	0.0469	0.0397	0.1653
Intercept	0.4114	0.1327	0.0020

Note 1. The weights used to compensate for heteroskedasticity are the inverse of the square root of the predicted values from a regression of the squared OLS residuals on the independent variables above and the interactions of the continuous variables.

Note 2. This analysis is based on only one replication of data. The no of observations is 606.

Note 3. Reference family type is single adult without children and reference level of schooling is compulsory schooling, i.e. less than 10 years.

**Table 6.** Transition matrix between deciles of net extended wealth 85/86 and deciles of net extended wealth 92/93. (Row frequencies sum to 100.)

Decile of distribution of net extended wealth 92/93

		1	2	3	4	5	6	7	8	9	10
Decile of distribution of net extended wealth 85/86	1	<b>36</b>	13	21	9	4	1	5	3	3	4
	2	19	<b>26</b>	10	13	7	12	4	3	4	1
	3	12	21	<b>16</b>	18	12	9	4	6	1	1
	4	14	17	13	<b>10</b>	12	8	8	7	8	1
	5	8	7	12	19	<b>9</b>	18	11	7	4	4
	6	5	8	8	14	21	<b>17</b>	8	7	7	3
	7	0	3	11	7	12	9	<b>13</b>	19	19	6
	8	2	4	5	3	6	19	21	<b>13</b>	17	10
	9	2	1	3	4	7	6	14	24	<b>21</b>	18
	10	1	0	0	2	7	1	10	10	17	<b>52</b>

*Note: This table is based on data from one replication of HUS data with a sample size of 777 households.*

**Table 7.** Multinomial logit model of decile wealth mobility.

<i>Variables estimate</i>	<i>Parameter</i>	<i>t-ratio</i>	<i>P-value</i>
<u>No change</u>			
Decil 2	2.596	4.957	0.000
Decil 3	1.233	2.427	0.015
Decil 4	.174	0.333	0.739
Decil 6	.215	0.445	0.656
Decil 7	.186	0.368	0.713
Decil 8	-.491	-0.974	0.330
Decil 9	-.108	-0.224	0.823
Single-single	.013	0.036	0.971
Single-union	.822	1.672	0.095
Union-single	-.636	-1.575	0.115
Mstatus undetermined	.524	1.017	0.309
Age18-34	.336	0.691	0.489
Age 35-54	.898	2.049	0.040
Age 55-64	1.212	2.812	0.005
Sec.dwell. & o. real estate	.442	1.744	0.081
Owner occupied home	.781	2.474	0.013
Liabilities	.548	1.626	0.104
Singles with children	-1.758	-1.514	0.130
High school, etc	-.052	-0.165	0.869
College, university	.203	0.748	0.454
Intercept	-3.375	-5.604	0.000
<u>Increased decile rank</u>			
Decile 2	2.064	5.141	0.000
Decile 3	.979	2.759	0.006
Decile 4	-.006	-0.019	0.985
Decile 6	-1.160	-3.261	0.001
Decile 7	-.366	-1.082	0.279
Decile 8	-1.519	-4.307	0.000
Decile 9	-1.993	-5.149	0.000
Single-single	-.870	-2.833	0.005
Single-union	.292	0.691	0.489
Union-single	-.853	-2.861	0.004
Mstatus undetermined	.270	0.576	0.565
Age 18-34	-.188	-0.545	0.586
Age 35-54	.209	0.684	0.494
Age 55-64	.634	2.086	0.037
Sec.dwell. & o. real estate	.374	1.808	0.071
Owner occupied home	1.227	4.937	0.000
Liabilities	.390	1.490	0.136
Singles with children	-1.616	-1.957	0.050
High school, etc.	-.059	-0.228	0.820
College, university	.674	3.062	0.002
Intercept	-1.421	-3.627	0.000

Note: The bottom and top deciles were deleted from this analysis. Reference familytype/marital status is a family with two partners living in a union both years with or without additional family members.

Log Likelihood: -688.663

Pseudo  $R^2 = 0.128$

No of observations 777

**Table 8.** Predicted shares of rank changes

	<i>Decrease</i>	<i>Predicted No change</i>	<i>Increase</i>	<i>Observed</i>
<i>Decreased decile rank</i>	0.561	0.139	0.300	0.456
<i>Unchanged decile rank</i>	0.404	0.195	0.401	0.157
<i>Increased decile rank</i>	0.352	0.163	0.485	0.387
<i>All deciles</i>	0.456	0.157	0.387	

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**Table 9.** Marginal effects of selected variables

<i>Variable</i>	<i>Change in probability to have a</i>		
	<i>decrease</i>	<i>no change</i>	<i>increase</i>
<i>Sec.dwell. &amp; o. real estate</i>	-0.078	0.032	0.046
<i>Owner occupied home</i>	-0.214	0.025	0.188
<i>Liabilities</i>	-0.088	0.043	0.046

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**Table 10.** Logit estimates of the probability to leave respectively the bottom and top decile.

<i>Variable</i>	<u>Probability to leave the bottom decile</u>			<u>Probability to leave the top decile</u>		
	<i>Slope</i>	<i>t-ratio</i>	<i>P-value</i>	<i>Slope</i>	<i>t-ratio</i>	<i>P-value</i>
Single-single	0.082	0.123	0.902	1.659	1.306	0.192
Single-union	-0.313	-0.352	0.725			
Union-single	-0.766	-0.848	0.396	0.690	0.833	0.405
Age 18-34	-1.284	-1.008	0.313	0.991	0.753	0.451
Age 35-54	-1.759	-1.438	0.150	-0.655	-1.006	0.314
Age 55-64	-1.779	-1.368	0.171	-0.994	-1.577	0.115
Sec. dwellings, o. real estate	-1.805	-1.186	0.235	0.306	0.617	0.538
Owner occupied home	4.414	2.908	0.004	0.426	0.419	0.675
Liabilities	1.417	1.778	0.075	-1.166	-1.286	0.198
Singles with children	0.681	0.509	0.611			
High school, etc	0.418	0.504	0.614	0.767	1.290	0.197
College, university	-0.037	-0.047	0.963	1.252	1.881	0.060
Intercept	0.118	0.102	0.918	0.484	0.363	0.717
Log likelihood		-44.102		-60.283		
Pseudo R <sup>2</sup>		0.289		0.103		
No of observations		97		97		
Mean predicted probability household did not change		0.435		0.421		
household changed decile		0.742		0.553		
Observed share of change		0.639		0.468		



## APPENDIX. Rubin's multiple imputation procedure

In brief the Rubin(1987) multiple imputation approach can be described as follows. Suppose  $y_1, y_2, y_3, \dots, y_k$  are  $k$  asset types and  $x_1, x_2, x_3, \dots, x_s$  are  $s$  socio-demographic variables<sup>22</sup>. Assume, for instance, that for a particular household  $i$  there is partial nonresponse on the first two asset variables. Using all complete observations one regression equation was estimated with  $y_1$  as the dependent variable and  $y_3 - y_k$  and  $x_1 - x_s$  as independent variables, and one equation with the same explanatory variables but with  $y_2$  as the dependent variable. The estimated equations were then used to predict the missing data on  $y_1$  and  $y_2$ . To preserve the variance of the original data a randomly drawn residual from the regression was added to the prediction. The same regressions were used for all households with missing values on the first two assets. For households with missing values on other assets than the first two new regressions were estimated following the same principle. For some assets with missing values one would have to determine if a household would have that asset at all before an imputed value could be assigned. In this case two equations were estimated one to determine the possession of an asset and one for the value of the asset conditional on possession.

The imputation technique introduces random errors into the imputed data set because the parameters of the regression equations are estimated and because regression residuals are randomly assigned to the imputed values. To estimate the relative importance of these imputation errors each missing data point was imputed ten times. The ten replications were obtained in the following way. For each replication new regression parameters were drawn from a multivariate normal distribution with a mean equal to the regression estimates and a covariance matrix equal to the estimated covariance matrix of the regression estimates. New residuals were also drawn for each replication. In this way we obtained ten different data sets, one for each replication. Observed data points were copied into each data set. Any statistic can thus be estimated ten times once for each data set and the variance between the replications estimated. The total variance is given by the following expression (see Little & Rubin(1987) p.257),

$$V_M = \overline{W}_M + (M + 1) B_M / M;$$

$$\text{where } \overline{W}_M = \sum_{l=1}^M W_l / M; \text{ and } B_M = \sum_{l=1}^M (\hat{\theta}_l - \bar{\theta}_M)^2 / (M - 1);$$

and  $\hat{\theta}_l$  is the parameter estimate from the  $l$ th replication,  $\bar{\theta}_M$  the mean over all  $M$  replications and  $\bar{W}$  is the mean over all replications of the variance estimates of  $\hat{\theta}_l$ . In our case  $M$  is 10.

Following Rubin(1987) one can interpret the ratio of the between replication variance and the total variance as a measure of the information missing due to partial nonresponse. Table A.1 exhibits estimates of the between replication variance, the total variance and their ratio for the means of seven assets and the mean of all liabilities. Estimates are given for each of the years 1983/84, 1985/86 and 1992/93. The table shows that the imputation share of the variance varies from a few per cent to almost 30 per cent of the total for some assets. However, it is interesting to note that the between replication variance is relatively small for the total, net extended wealth. The explanation is probably that a randomly large imputation of one type of asset is compensated by a relatively small imputed value for another type. The properties of the imputation procedure mimics those of real data. An implication of this result is that it is relatively "safe" to use only one replication in an analysis of total net extended wealth. Table 2.1 also indicates that the relative importance of the imputation variance was higher in 1992/93 than in the previous two years.

Finally we should note that the whole imputation approach rests on the assumption that the probability to respond on the question about a particular asset is independent of the residual of the regression equation of this asset. If this would not be true and the partial nonresponse selective in this sense, the imputation procedure will not correct for this selectivity.

**Table A.1.** Estimated between and total variances of the mean of each wealth component and the share of information missing due to partial nonresponse. Values in current prices.

	<i>Between variance</i>	<i>Total variance</i>	<i>Share</i>
	$\times 10^5$	$\times 10^5$	
<i>Cross-section 1983/84</i>			
Owner occupied housing*	27.37	122.32	0.22
Sec dwell & other real estate*	6.63	289.34	0.02
Life insurance policies*§			
Private pension policies*§			
Bank deposits	0.26	3.05	0.09
Stocks and bonds	1.56	25.29	0.06
Consumer durables	1.92	17.97	0.11
Debts*	4.80	40.49	0.12
Net extended wealth\$	11.15	171.61	0.07

Table A.1 continues

<i>Cross-section 1985/86</i>			
Owner occupied housing*	7.63	57.03	0.13
Sec dwell & other real estate*	19.63	3361.10	0.01
Life insurance policies *	4.63	42.06	0.11
Private pension policies*	6.05	42.64	0.14
Bank deposits	0.29	3.53	0.08
Stocks and bonds	0.96	17.10	0.06
Consumer durables	3.47	18.02	0.19
Debts*	13.38	114.83	0.12
Net extended wealth	11.54	425.60	0.03
<i>Panel 1992/93</i>			
Owner occupied housing*	34.43	132.96	0.26
Sec dwell & other real estate*	224.45	12662.33	0.02
Life insurance policies *	3.60	42.76	0.08
Private pension policies*	4.43	29.19	0.15
Bank deposits	2.94	11.99	0.24
Stocks and bonds	6.08	23.22	0.26
Consumer durables	5.44	21.14	0.26
Debts*	2.71	36.46	0.07
Net extended wealth	27.20	1630.48	0.01

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The sample sizes were: 1983/84 1505, 1985/86 1772, and 1992/93 1150.

\*The estimated mean is conditioned on ownership

§The variable was not observed this year

§ Net extended wealth is the sum of all assets listed in this table, see section 3.

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<sup>1</sup> For this study we were only able to use the 1993 panel. A new supplementary sample was not yet available for analysis. Preliminary comparisons of a few marginal distributions show no major differences. The supplementary sample has marginally higher estimates of wealth in owner occupied homes and of mortgages, and marginally smaller estimates of financial assets compared to the panel.

<sup>2</sup>Kapitalförsäkringar

<sup>3</sup>Lottery bonds were not always declared for taxation and the authorities had no register which covered owners of these bonds.

<sup>4</sup>For details see the Appendix table in Bager-Sjögren & Klevmarken(1995).

<sup>5</sup>One exception is students' loans the interest of which is not deductible.

<sup>6</sup>In the HUS surveys 16 per cent of all households had more than two adults in 1984. The corresponding estimates for 1986 and 1993 were respectively 20 per cent and 14 per cent. In the 1993 wave of HINK a new household concept similar to ours was introduced parallel to

the old concept. A comparison showed that the number of households according to the old definition exceeded that of the new by 13.7 per cent. (Statistiska Meddelanden Be21 SM 9501, Table 54)

<sup>7</sup>Personal communication with Kjell Jansson, Statistics Sweden.

<sup>8</sup>Another source of comparisons is the aggregate national accounts statistics. The difference in population coverage and evaluation principles is, however, even larger than in the comparison with HINK. For a discussion see Bager-Sjögren & Klevmarken (1995) footnote 5.

<sup>9</sup>Tables 36, 39 and 40, Inkomstfördelningsundersökningen Be21 SM 9501, Statistics Sweden.

<sup>10</sup>The point estimate of 598 000 crowns for 1992/93 is influenced by an outlier with a very high value in Secondary dwellings and other real estate. If this outlier is deleted the point estimate drops by about 40 000.

<sup>11</sup> Half a million Swedish crowns approximately equaled 65-70 thousands US dollars.

<sup>12</sup> The top decile includes an outlier in the category "Secondary dwellings and other real estate" of 50 million crowns. If this household is removed from the analysis the mean drops from 1248 thousands to 820 thousands and the share of secondary dwellings and other real estate decreases to 35 per cent. The share of owner occupied housing increases to 25 per cent and the remaining shares increase one or two percentage points.

<sup>13</sup> This is further evidenced in Figures 3.1a and 3.1b in Bager-Sjögren & Klevmarken(1995), which compared debt ratios by wealth decile using both with HUS and HINK data.

<sup>14</sup> Results from the HINK surveys show that the share of total net wealth belonging to the 1 per cent wealthiest increased from 17.7 per cent in 1983 and 15.7 per cent in 1985 to 20.7 per cent in 1990 and 19.5 per cent in 1992.

<sup>15</sup> The elasticity of the Gini coefficient with respect to the k:th component of wealth is defined by

$$\eta_k = (\mu_k/\mu)(C_k-G)/G;$$

where G is the Gini coefficient of total wealth,  $C_k$  the concentration index for wealth component k and  $\mu_k/\mu$  the population share of component k.

<sup>16</sup>It is assumed that the asset increases in value such that its concentration index is unchanged.

<sup>17</sup>It is a weakness of this regression analysis that all households with nonpositive wealth in any of the two years were dropped from the analysis. The mobility analysis in the next section does not have this deficiency.

<sup>18</sup> Shorrocks' measure of mobility (Shorrocks 1978) is defined as

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$$S=(N-\text{tr}(P))/(N-1);$$

where  $N$  is the number of groups (deciles) and  $\text{tr}(P)$  is the trace of the  $N \times N$  transition matrix  $P$ . The range of  $S$  is  $[0, N/(N-1)]$ , and a higher  $S$  indicates a higher degree of mobility.

<sup>19</sup> It is also interesting to note that when the analysis was limited to a subsample of stable households the relevant parameter estimates did not change much.

<sup>20</sup> If consumer durables are excluded from the wealth definition Shorrocks' mobility measure drops to 0.85.

<sup>21</sup> Only if a head dies the headship goes to the surviving spouse.

<sup>22</sup> The following socio-economic variables were used:

- The mean of the tax assessed values of owner occupied houses in the municipality where the household lived  
for at least one of the years 1983, 1985 and 1992.
- The purchase coefficient for that municipality for at least one of the years 1983, 1985 and 1992.
- The number of adults, above 18 years of age for at least one of the years 1983, 1985 and 1992.
- The number of employed adults for at least one of the years 1983, 1985 and 1992.
- The age of the household head in 1985/86
- Years of schooling of the household head in 1985/86