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HEADSHIP RATES AND THE HOUSEHOLD
FORMATION PROCESS IN GREAT BRITAIN

BY

ANIL MARKANDYA

GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

CENTER FOR REAL ESTATE AND URBAN ECONOMICS
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Working Paper 82-50

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ABSTRACT

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FORMATION PROCESS IN GREAT BRITAIN

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This paper looks at the changes in headship rates in Great
Britain over the period 1960-1979, and attempts to explain them
in terms of economic variables, such as real income and the real
cost of housing. Such variables are found to be significant for
some household types, but not for others. Notably, young single
person household formation appears to be more supply constrained
and to respond to appropriate supply variables.

Finally, some comparisons are made with similar studies done
on similar data from the U.S. and France. These studies reveal a
number of features in common, but also some differences, and these
are commented upon.

HEADSHIP RATES AND THE HOUSEHOLD
FORMATION PROCESS IN GREAT BRITAIN

1. Introduction

One important ingredient in the modelling of the housing
market in any developed country is the analysis of the headship
rate in different household categories. The headship rate is the
ratio of the number of persons in any sub-group of the population
who are head of household to the total number in that population.
The main categories by which people are grouped for this purpose
depends on the main social divisions of household type and on the
extent to which the demand for housing differs from one category
to another. In the U.S., for example, headship rates are defined
by age and by individual and family households. Family households
consist of married couples with children and lone parents. In-
dividual households consist of single people, unrelated people
sharing common housekeeping facilities and unmarried couples.[1]
In that country the main growth in housing demand over the last
decade has come from non-family single person households, and from
female headed lone parent households. For example, between
1970 and 1980, these two categories accounted for 62% of the
increase in the total number of households. Moreover, the rela-
tively low headship rate levels, and their fast rate of growth,
for some age groups within those categories indicates the great
potential for future household demand that they represent. Within
the category of female lone parent household the main increase

came from divorced women who were up 139% over the decade. Apart

from the implications for overall growth of household demand,

such figures are also indicative of a changed structure of demand;

not only is the kind of dwelling unit demand demanded by single

individuals, sharers and divorcees likely to be different in struc-

ture and location from that demand by families, but it also implies

a different household demand by income category. In the non-family

single person household category the main growth areas for headship

rates has been the young. The under 24 age group headship rate

went up 160% from 1970 to 1980 and probably translates itself

into higher demand for small flats in urban areas. In fact if such

growth is sustained over the next decade it could very well imply

a different future for city housing, compared to what is con-

ventionally expected to happen, by simply projecting current

suburbanization trends.

Given past data on headship rates one attempts to predict

their future evolution in some way or other. Such predictions

are then combined with demographic projections of the population

by age group and marital status to give overall household demand

by different social categories.[2] In general in the past, es-

timates of headship rates has been done by trend analysis alone.

Such a procedure ignores, however, the social and economic forces

that impinge on the decision to form a household and could, in

consequence, give misleading results over the medium and long

term. Moreover, past household formation decisions may have been

supply constrained. If the excess demand that prevailed in the

past is eliminated these headship rates could shoot ahead and a
time trend analysis of future demand could be misleading.[3] The
main social variable that determined household formation in the
past was the marriage rate. As far as the U.S. evidence is con-
cerned this is beginning to look untrue. The divorce rate and
the length of time that a person remains divorced are clearly
of great importance in explaining the household formation figures
quoted above. In addition, the propensity of young people to
live apart from their parents and to postpone marriage, and of
old people who are inclined to maintain their own home, have had
an increasingly important role to play. On the economic side,
the real incomes of such households and the relative price of
housing would be expected to have a role to play. Real incomes are
influenced not only by earnings but also by social security bene-
fits and it is the rise in their real levels among pensioners that
could explain an increased headship rate in that group. On the
price side, the U.S. evidence shows a drop of nearly 20 percent
in the real price of rental housing. Such a significant reduction
would be expected to result in increased household space con-
sumption and indirectly into household formation.

In this paper we examine similar evidence on headship rates
and related variables in the U.K. The information available
is pieced together from various sources and is of varying degrees
of reliability, ranging from census data to data gathered by the
General Household Survey Although somewhat unsatisfactory, it
nevertheless presents us with some insight into the changing

structure of households in this country and offers an opportunity
of comparison with the U.S. One major difference with the U.S.
that would be expected to influence <u>observed</u> household formation
in Great Britain is the fact that the pricing mechanism is only
marginally relevant to about half the dwelling units in this country,
namely the private and publicly rented accommodation. This implies
that household formation, insofar as it is constrained by those
sectors, is likely to be supply constrained. In that case headship
rates for some categories will be influenced not especially by
real income and prices, but also by variables that reflect their
relative market power. Such variables are tried in some regres-
sions of headship rates for categories that form households, par-
ticularly in the private rental sector, and some success is achieved
with them. For the rest of this paper we proceed as follows:
in the section below we present a picture of the household for-
mation process in Great Britain over the last two decades, and
compare it with similar data from the U.S. In Section Three,
a headship rates series for Great Britain is constructed by in-
terpolating between census points and regressed on some of the var-
iables discussed above for which data is available. The results are
quite encouraging and have a number of implications for housing
policy which are discussed in the final section.

2. <u>Household Formation in the U.K.</u>

Table One below gives the number of households in Great
Britain for the years 1961, 66, 71 and 79. We observe that the
largest growth in households occurred in single person households over

retirement age (up 147% from 61 to 79) followed by single person households under retirement (up 117%) and lone parent households with dependent children (up 114%). Multiple non-family households fell considerably in number, while family households with children fell slightly and childless married couple households increased slightly. These developments are broadly quite similar to those experienced in the U.S., except that whereas in the U.S. the growth of single person households has been more evenly spread out over all age groups, in Great Britain it has been concentrated considerably among retired households. The difference between the two countries is seen more clearly in Table Three where headship rates are given for 1970 (US) and 1971 (GB) for different age groups. Unfortunately, the figures are not directly comparable as the age groups differ and the classification of men and women is not uniform in Britain as it is in the U.S. Nevertheless, there are major differences in headship rates at both ends of the age distribution. The under 30 age group in Britain probably has quite a similar headship rate as the same age group in the U.S. As the headship rates rise sharply with age, and as the under 30 age group in Britain has about the same headship rate as the under 24 age group in the U.S., the British figures for comparable age groups are likely to be slightly lower. On the other hand, the bottom G.B. group is divided by the total population between 15-30, whereas the U.S. group is divided by the total population between 18-30. This would tend to give relatively higher G.B. figures for comparative base populations. Looking at the figures

in greater detail indicates that these two factors cancel each other out sufficiently for the comparable headship rates not to be dissimilar. For the middle age groups (25-64), the U.S. figures appear to be significantly higher than in G.B.. This is especially true of the 30-44 age group. Finally, for the higher age group the ranking of the two countries is reversed again, with the British figures being considerably greater than the American ones. For married households, headship rates are generally higher in the U.S.. The only possible exception is the youngest age group. The under 24s in the U.S. have a considerably lower rate than the under 30s in Britain. A major part of this is accounted for, of course, by the higher headship rates within the 24-30 population. Indeed, interpolating headship rates linearly between age groups indicates only slightly lower figures in the U.S. for comparable populations.

It is hard to account for all these comparative differences without further study,[4] but the main features probably arise from the different income and housing market conditions in the two countries. It is generally believed that household formation in Britain, particularly among young single persons, is greatly constrained by the lack of private rental accommodations and the long queuing time for public housing. By itself this should result in less household formation than an equilibrium situation would warrant. Since this equilibrium itself is likely to be lower than that in the U.S., as real incomes in the latter are higher and relative real housing costs probably lower, the implication is that we should

TABLE ONE

Households in Great Britain 1961 - 1979
Total Thousands

Household Type \ Year	1961	1966	1971	1979
No Family				
One person under retirement	726	890	1122	1576
2 or more under retirement (1)(2)	536	463	444	394
One person over retirement (1)	1193	1682	2198	2955
2 or more over retirement (1)(2)	268	251	304	197
Family				
Married couple only	4147	4377	4890	5319
Married couple with dependent children	6117	6054	6305	6107
Married couple with independent children only	1673	1746	1565	1379
Lone parent with dependent children	367	400	515	788
Lone parent with independent children	721	755	712	788

Source: Social Trends

(1) retirement is defined as 60 for women and 65 for men.

(2) The household is classified as a retirement household if it has at least one person over retirement age.

The 1961 and 1971 figures are census figures, the 1966 figures are from the mid-census sample and the 1979 figures are constructed by multiplying the distribution of households by marital status as given in the general household survey by the estimated total number of households in 1979.

TABLE TWO

Headship Rates in Great Britain
Per 100 Households

	1961	1966	1971	1979
Non-Family Households under retirement[1] age	10.00	11.76	15.51	14.57
over retirement age	43.61	56.04	60.84	75.05
Family Households all households	49.57	49.01	51.50	52.86

Source: Social Trends and Annual Abstract of Statistics

(1) The base population is taken as the non-married population under 65.

TABLE THREE

A. Comparison of U.S. and G.B. age specific headship rates in 1970-71   Per 100 Households

U.S. (1970)				G.B. (1971)				
<24	25-34	35-64	65+	<30	30-44	45-64[1]	65+[2]	
4.2	25.9	42.9	54.1	4.3	19.6	40.3	66.0	non family
24.4	51.5	56.3	69.1	39.6	45.9	53.6	52.3	family

Sources: 1971 (Census) - U.K. and Rosen & Jaffee (1981) - U.S.

(1) Women are excluded from this group if they are over 60 and head of household. They are excluded from the population if they are over 60.

(2) Women are included in this group if they are over 60 and head of household. They are included in the population if they are over 60.

see lower headship rates in Britain.   In general, this appears to be
so, with the exception of non-family households over 65.   The figures
for such households are not directly comparable as in the British
data they include women over 60 and men over 65, whereas in the U.S.
they include both groups over 65.   The effect of this statistical
difference will depend on how the headship rate for 60-65 year old
unmarried women compares with the rest of the group.   No clear an-
swer is available for this, although the figures do indicate that
headship rates for males and females combined rise with age.   This
would suggest then that the G.B. figure of 66 percent is an under-
estimate of the headship rates for a group comparable to the U.S.
one and that the difference between the two countries is even more
exaggerated.   The main reason for this is probably the priority
given to such people in public sector housing in Great Britain.
As the General Household Survey indicates, the proportion of housing
accounted for by the public sector increases with age for single
person households.   This lends some support to the above argument.

The other notable difference between the two sets of figures
is very much lower headship rates in Britain among 65+ married
households.   This difference is, however, largely statistical.   As
married women are never classified as heads of households when their
husbands are present, the inclusion of women from 60-65 merely increases
the denominator of the headship rate without affecting the numerator.
In fact, removing this group entirely raises the headship rate from
62.3 to 68.3 percent.   This makes the relative set of figures for

family households very similar and suggests that on the whole,
family household headship rates are only slightly lower in Britain
than in the U.S., with the lowest age group having almost the same
figures.

In Table Two, we present some data on headship rates over
time. Looking at headship rates rather than household numbers,
the increase in single retired person dwellings is not so marked.
The reason, of course, is the aging of the population. Between
1961 and 1981, persons within the retirement ages used in these
tables are estimated to have increased from 14.6% to 16.5% of
the population, while the working ages (from 15 to 56/64 for
women and men respectively) are estimated to have declined from
62.1% to 59.6% of the population. Between 1971 and 1979 Table
Two indicates a drop in the headship rate for households under
retirement age. However, it should be remembered that the 1979
figures are based on an estimate of the overall number of house-
holds and should therefore be treated with caution.[5]

Table Four lists the values of some of the variables which
are likely to influence the headship rate. Firstly, the stock of
divorced persons has increased more than fourfold between 1961
and 1979. The effect of this on headship rates, however, is
complex. During the tenure of their divorce, individuals are likely
to add to household demand by occupying separate dwellings. The
party that has children is classified as a lone parent while the
party that does not is classified as a non-family household. Un-
fortunately a breakdown of the divorced population into these cat-

egories is not available. Hence, one can only try the aggregates
variable in explaining both "family" and "non-family" household
formation. Secondly, we consider the real cost of housing. With
minor exceptions, this rose gradually over the sixties, until
1973, and fell sharply between 1974 and 1978. In 1979 it rose
again. One would expect this to influence household formation
mainly in the owner occupied sector. Although the housing price
index combines owner-occupied costs and rental costs, the latter
have had little influence on the variations in the index. More-
over, as stated earlier, both the private and public rental housing
markets are in excess demand at the current price and so changes in
price are unlikely to reveal anything about the demand for house-
holds. Where there is rationing, household formation will probably
be influenced by the relative market power of different groups
in the private sector and by the relative social priorities accorded
to them in the public sector. As far as the former is concerned,
one might be able to pick this up by looking at the relative in-
comes of different groups. In the fourth and fifth columns we have
the average net relative household incomes of single person house-
holds under and over retirement age respectively.[6] This is obtained
from the Family Expenditure survey and includes benefits paid.
We see that both these groups have improved their position relative
to all households between 1961 and 1979. For the younger age
group this might increase their ability to acquire housing in the
private rental sector, relative to other households. In the public

TABLE FOUR

Social and Economic Variables Influencing Headship Rates

Year	Divorced[1] Population Stock (000)	Average real[2] cost of housing (index)	(3) Average net-real income of all households	Average income of all single person households under retirement age ÷ Avg. inc. of all households	Average income of all single person households over retirement age ÷ Avg. inc. of all households
1961	285.0	1.000	847	.48	.24
1962	296.4	0.996	853	.45	.23
1963	306.9	1.024	889	.51	.23
1964	318.5	1.044	910	.54	.23
1965	329.0	1.052	900	.52	.25
1966	342.0	1.080	942	.48	.24
1967	386.6	1.103	944	.52	.26
1968	432.1	1.106	949	.51	.26
1969	480.4	1.092	955	.51	.28
1970	515.5	1.105	978	.51	.27
1971	517.0	1.101	997	.57	.28
1972	600.0	1.136	1063	.59	.28
1973	700.0	1.163	1129	.60	.29
1974	779.0	1.120	1166	.64	.30
1975	871.0	1.070	1148	.65	.33
1.76	969.0	1.047	1102	.59	.34
1977	1037.0	1.021	1080	.61	.34
1978	1146.0	1.011	1154	.61	.34
1979	1243.0	1.074	1154	.60	.34

P|t|0

Sources:

(1) Social Trends, various issues
From 1971 onwards the divorced population is estimated and reported by the Census of Population office. Prior to that they only report the divorced and widowed population for intercensus years. This series is constructed by linearly interpolating the ratio of divorced to widowed between census years.

(2) This is the ratio of the housing component of the CPI to the total CPI. Annual Abstract of Statistics.

(3) Annual Abstract of Statistics. Data is taken from the Family Expenditure Survey and reports income net of taxes and inclusive of benefits paid.

rental sector, higher relative incomes are not likely to help in acquiring housing; in fact the reverse is more likely to be the case. There appears to be no straightforward way of identifying an index of priorities for public sector rental housing, but it is likely to favor older persons, lone parents and large low-income households and pay little attention to small variations in relative incomes.

Looking at the average real income of all households (Column 3 in Table Four), we see a fairly steady increase over the last two decades, with households in 1979 having incomes 36% higher than in 1961. As the average size of households has decreased marginally over this period, this reflects a slightly higher increase in real per-capita income. On both counts then, we would expect the demand for household formation to increase over this time and observed household formation to be related to the change in incomes when the market is not constrained on the supply side.

In the next section we report some econometric results in headship rates over this period for family households, non-family retirement households and non-family non-retirement households.

3. Econometric Evidence on Headship Rates

Annual headship rates from 1961 to 1979 were obtained for the household categories given in Table Two and log linear regressions were performed on the lagged value of the headship rate, along with various combinations of income, relative income, price, and other demographic and economic variables. The lagged value

TABLE FIVE

Econometric Estimates of Headship Ratio in Great Britain

1. $\log(NFHORA) = -0.64 + 0.42 \log(NFHORA-1) + 0.31 \log(RCDH)$
    $\quad\quad\quad\quad\quad\quad (4.3)\quad (3.4)\quad\quad\quad\quad\quad\quad\quad (2.7)$

    $\quad\quad\quad\quad + 0.32 \log(YNFHORA)$
    $\quad\quad\quad\quad\quad (4.0)$

    $\quad\quad CRSQ = 0.984 \quad\quad F(3/14) = 345.42 \quad\quad DW(0) = 2.06$

2. $\log(FHALL) = -0.41 + 0.46 \log(FHALL-1) - 0.13 \log(RCOH)$
    $\quad\quad\quad\quad\quad\quad (2.4)\quad (2.1)\quad\quad\quad\quad\quad\quad\quad (2.1)$

    $\quad\quad\quad\quad + 0.03 \log(Y2A)$
    $\quad\quad\quad\quad\quad (0.7)$

    $\quad\quad CRSQ = 0.940 \quad\quad F(3/14) = 89.28 \quad\quad DW(0) = 1.82$

    Error term assumed to be a first order autoregressive process: $E_t = PE_{t-1} + V_t$ estimate of $P = 0.9$

3. $\log(NFHURA) = -19.69 + 0.44 \log(NFHURA-1) + 0.65 \log\left(\dfrac{YFHURA}{YALL}\right)$
    $\quad\quad\quad\quad\quad\quad\quad (3.1)\quad\quad (2.4)\quad\quad\quad\quad\quad\quad\quad (1.7)$

    $\quad\quad\quad\quad + 2.03 \log(HGBSTOK) + 0.79 \log\left(\dfrac{RCOH}{YNFHURA}\right)$
    $\quad\quad\quad\quad\quad (3.1)$

    $\quad\quad CRSQ = 0.919 \quad\quad F(4/13) = 49.28 \quad\quad DW(0) = 1.98$

t-statistics are given in parenthesis

Definitions of Variables:

NFHORA = headship rate among non-family households over retirement age (60 for women, 65 for men)

NFHURA = headship rate among non-family households under retirement age

FHALL = headship rate among family households (married couples and lone parents)

RCOH = index of the real cost of housing

YNFHORA = net real income of single person households over retirement age

YNFHURA = net real income of single person households under retirement age

YZA = net real income of households consisting of two adults only

YALL = net real income of all households

HGBSTOK = stock of dwellings in Great Britain

CRSQ = R^2 corrected for number of variables

DW(0) = Durbin Watson Statistics

F(3/14) = f statistic for three exogenous variables and 14 degrees of freedom.

of the headship rate is included to indicate partial adjustment
of the actual rate to the desired rate. On the assumption of a
geometric distributed lag, its coefficient is simply related to
the average lag in the adjustment of the headship rate to the
exogenous variables. A number of interesting findings emerged
from this exercise. Firstly, the divorce population, or its rate
of change was not significant in affecting the headship rate
in any of the equations, although it had the expected sign (pos-
itive) in the regressions on FHALL (the headship rate for family
households) and on NFHURA (the headship rate for non-family house-
holds under retirement age). Secondly, the regressions of NFHURA
on the real price of housing and on real single-person-household
income gave poorly determined coefficients for those variables.
This is what one would expect given the excess demand state of
the private rental market, which is the main source of additional
dwellings for that group. Instead it was found that using relative
income and the existing stock of housing performed considerably
better in regressions in NFHURA. For FHALL and NFHORA (non-family
households over retirement age) on the other hand, real income and
the real house price were generally better explanatory variables
than relative income and the stock of housing. This suggests
that for these groups a supply constrained view of the household
formation process is possibly not so relevant. A summary of the
regression results is given in Table Five below. The main points
worth noting are:

a) The rate of adjustment towards the desired headship rate

is remarkably similar for all three groups. The coefficient
in the lagged value of the dependent variable lies between
0.42 and 0.46, indicating that half the adjustment takes
place within 0.7 to 0.9 of one year.[7] Given such values of
this coefficient the long run elasticities are roughly double
the estimated elasticities for the other variables.

b) For the over retirement age group both price and income var-
iables are highly significant but the price variable has a
positive sign. It is hard to account for this, except perhaps
to suggest that there is a wealth effect associated with house
prices which is being picked up here. If house ownership
is a significant source of wealth for older people, then their
decision to maintain a separate household after retirement may
be linked to the realization of part of their wealth as they
"trade down" into smaller housing units. Undoubtedly the variable
RCOH is strongly correlated to the movement in house prices
and this might be what we are picking up. An income elasticity
of 0.3 seems plausible.

c) For married couples household formation is significantly af-
fected by the real cost of housing but not by real income. Perhaps,
the income variable used is not appropriate. However, other
ones were tried but with no appreciable success. One generally
finds that the income variable has the right sign but is in-
significant. It is possible that within the range of variation
of real incomes experienced by family households, the household
formation decision is insensitive to such variations. It should

also be noted that the divorced population came closest to
being significant for this group, with a short run elasticity
of 0.02.

d) For non-family households under retirement age, two rationing
type variables were tried: the relative income of single person
households and the real cost of housing relative to the in-
comes of such households. At the same time the stock of
houses was included to pick up the effects of a changed allo-
cation of an expanded stock to young non-family households. All
variables are significant and all have the expected sign with
the exception of the relative cost of housing which is positive.
This suggests that a rise in the cost of such housing relative
to income results in increased household formation in this group.
As stated earlier, RCOH picks up the movements in real house
prices and has little to do with private sector rents. A
rise in such prices relative to incomes could induce owner
occupied household formation. The quicker one can get on
the house price escalator, the better it is, and the attractions
of owning increase as real prices are observed to rise. Finally
for this group, a one percent increase in the stock of housing
results in a two percent increase in household formation.
Such an effect is included to pick up the changed "ration"
of housing accorded to young non-family households and the
value, though high, seems plausible.

Conclusions

In this paper we have examined household formation as a
social and economic process and tried to identify some of the
relevant variables that could influence it. In this we have
been fairly successful. What this paper suggests is that one
should be careful in interpreting observed household formation
in a disequilibrium market. For some groups headship rates are
supply constrained and for others they are not. The observed
rates for both groups are useful in prediction only as long as
the appropriate market regime remains in force. Once we move from
equilibrium to supply constraint and vice versa, the behavior
of headship rates will change. In addition to price and income
effects there are also wealth effects at work, and separating these
from the price effects is a task for further study. It should also
be noted that similar studies on French and U.S. data reveal some
similar features: confusing price coefficients, plausible dis-
tributed lag coefficients and income coefficients and, in the case
of France, similar difficulties with using price and income variables
for young households.

FOOTNOTES

1. The U.S. headship figures in Rosen and Jaffee are not directly comparable with the British or French data. This is because Rosen and Jaffee define the headship rate for a particular group, say single people between 25-34, as the total number of households headed by a single person in that age group divided by the total population in that age group. In official British and French data, the headship rate is obtained by dividing the total number of households in the relevant age group by the population within the same age group and with the same characteristics as the head of the household -- i.e. by the total number of single people between 25-34 in the above example. Although the levels of headship rates will clearly differ according to which method is used, the relative movements are very similar, and the econometric estimates using one rather than the other as the dependent variable do not appear to vary widely. In Table Three, where we compare U.S. and G.B. headship rates, we have adjusted the U.S. figures to make them compatable to our own.

2. One works with headship rates rather than actual households per category because the former is less susceptible to forecasting error than the latter. Given headship rates, these can be used in a full housing market model to estimate the demand for different types of dwelling units, housing starts, and other variables in the housing market.

3. If future supply is based on such predictions, it could, of course, look as if the prediction was correct! Such self fulfillment ignores the fact that the demand for housing is unsatisfied at the current price.

4. It is perhaps worth noting that the French data on headship rates is more similar to the U.K. than to the U.S.

5. There is an element of circularity about the method by which the headship rates for 1979 are calculated. We take P_i, the proportion of households of type i in the General Household Survey and multiply it by $\Sigma h_j x_j$ which is an estimate of the total number of households; h_j being the headship rate for group j and x_j the total population of that group. Hence, our estimate of h_j, call it $\hat{h}_j$ is

$$\hat{h}_j = \frac{P_i \, \Sigma h_j x_j}{x_i}$$

Although it should be remembered that the h_js themselves are estimates, there is a likelihood of a smaller error in $\hat{h}_i$ than in h_i. For example if h_i is wrong by 10%, but the other h_js and P_i are correct, then

$$\hat{h}_i = \frac{h_i x_i}{\Sigma h_j x_j} \cdot \frac{\Sigma h_j x_j \pm 0.1\, h_i x_i}{x_i}$$

$$= h_i \left\{ 1 \pm 0.1\, \frac{h_i x_i}{\Sigma h_j x_j} \right\} = h_i \{ 1 \pm 0.1 P_i \}$$

For a small group (say around 10% of the total population, the error in $\hat{h}_i$ is around 1%. This argument applies more generally if the error in the h_js tend to cancel each other out and if the errors in the f_is are small.

6. Ideally we should deflate their nominal incomes by different price indices corresponding to their consumption patterns. Unfortunately such indices are not available for the time period in question.

7. If the dependent variable is H_t and the co-efficient on H_{t-i} is B_1, then $\dfrac{B_1}{1 - B_1}$ is the average lag in the adjustment of H_t to the exogenous variables.

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