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ABSTRACT

Intra-Household Allocation and the Living Standards of the Elderly in Greece*

This Paper attempts to expand the literature of intra-household allocation by looking at how resources are allocated between the elderly and their grown-up children with whom they live. It uses data over the 1970s, 1980s and 1990s from the Greek Household Budget Survey to test the hypothesis that relative incomes within the household have no bearing on shares of total household resources. This restriction is rejected suggesting that poverty rates of the elderly are higher than those obtained from looking at the distribution of household incomes.

Keywords: living standards and poverty rates

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1 Introduction

Over the last two decades economists and policy makers have been increasingly interested in the question of how households allocate their resources amongst household members. Much of this research has focussed on nuclear families, looking at the distribution of resources within couples or between parents and their grown up children. This paper thus adds to the existing literature by looking at extended families. It is concerned with the problem of measuring the living standards of the elderly in Greece, many of whom live with their grown up children who tend to be much richer. We show that the assumption of "income pooling" (i.e. that what you bring into the household has no effect on your own personal share of household resources) is rejected by the data. This indicates, among other things, that poverty measures based on household income are a significant under estimate of the true figure.

There are of course a myriad of problems inherent in trying to measure the distribution of welfare across individuals. As we cannot make interpersonal comparisons of utility, we need to focus on access to resources (the position of the budget constraint). As observed resources depend on choices made by the individual now and in the past (education and training choices and the work-leisure trade-off for example), we need to make some assumptions about how these choices are determined. Lastly we need to deal with the fact that individuals live together in households and it is this last problem that the paper tries to address.

The fact that people live together in households raises two issues. First differences in household composition mean differences in household level economies of scale and hence living costs. Second differences in the distribution of independent resources (or bargaining power) may results in differences in the final distribution of resources within the household (There is an existing extensive literature on both these issues but see Lewbel at al. [2001] for a discussion of the two problems together). Without a coherent model of both these effects we have no way of judging how the access to resources changes when individuals

move across households of different sizes and different income distributions. The problem is that we are interested in individual level consumptions but we only see (at best) individual level expenditures. The mapping between the two depends both on economies of scale and on household level sharing arrangements that are both unobservable.

The simplification often made is to assume that all household members pool their resources. This means we should not consider someone with resources X living in a two person house with total resources Y as being "better off" than someone with resources X/2 living in a two person house with total resources Y. Given this assumption, equivalence scales that allow household incomes to be normalised for differences in composition are constructed in various ways[1] Lewbel at al. (op. cit.) develop a method, in the case of couples, for estimating equivalence scales that include the effect of differences in individual level bargaining power. Our strategy is less ambitious, we simply test the restriction of income pooling (i.e. that differences in bargaining power have no effect on the distribution of resources within the household) amongst extended families in Greece.

The assumption of income pooling within couples has often been rejected by the data[2] and as the kinds of institutions binding nuclear families together (marriage, romantic love etc.) are much weaker when we move onto the case of extended families we might think that there is no need for further investigation. In countries like Greece, however, financial transfers between parents and children are very common. For example it is parents rather than financial institutions that provide the funds for house purchases. Parents also are far more likely to pay large sums towards their children's education. Such intergenerational transfers could be seen to replace capital markets. Instead of people saving for their old age, they make investments in their children recouping the

[1] For example by looking at the share of a necessity in total expenditure. "Richer" households will have a smaller share and so looking at how these shares depend on household size and compositon, given income will give a strong indicator of differences in the cost of living (see McClemments 1977)

[2] see Bourguignon, Browning, Chiappori, and Lechène 1994 for example

benefits after retirement. Thus it is not only altruism that would result in equilibria where household members share their resources. It is this effect that motivates the need for further investigation.

Given that the old tend to be poorer than the young (at least in terms of measured income) and that it is likely that this inequality is greater between the old and the young living at the same address, we could consider poverty rates based on the assumption of income pooling as providing a lower bound to the actual figure. An upper bound could be obtained by looking at the relative independent income of the elderly. This cannot be a tight upper bound as it ignores the fact that poorer household members will also have access to household level public goods even when there is no sharing. In the UK these bounds are relatively narrow as a small proportion of the elderly live with their children. In Greece, given the high incidence of multigenerational households these bounds are very wide. Figure 1 shows how sensitive the measured poverty rates are to assumptions about sharing within the household. The upper bound is about twice the lower bound.

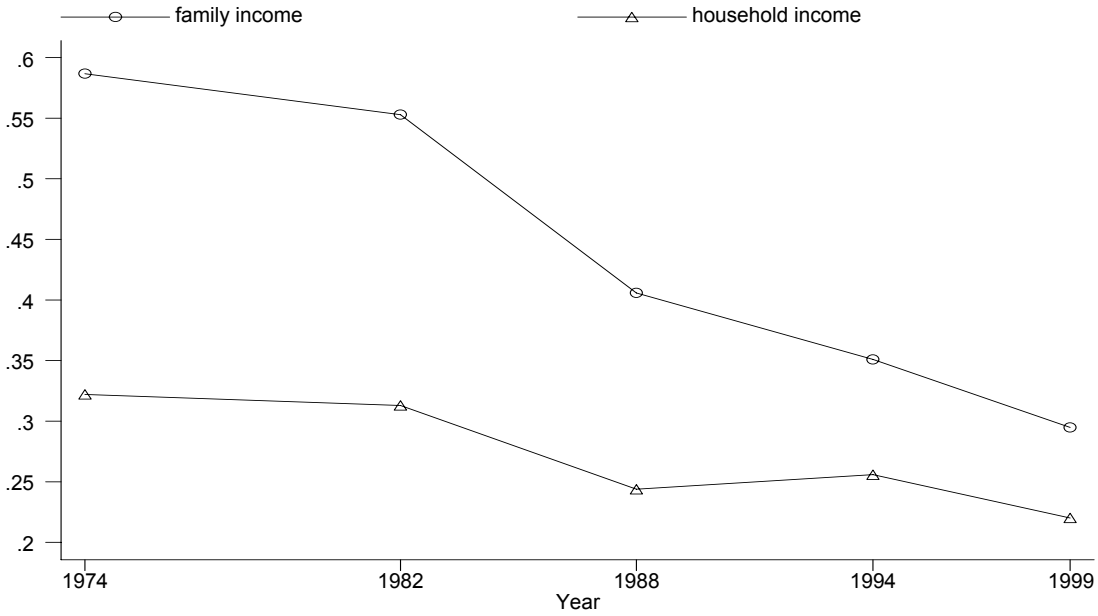

Figure 1: **Poverty rate measured by household and family income** Notes: graph shows proportion of elderly people with estimated equivalised income less than 50% of the current overall median. Data is from the Greek Household Budget Surveys (see below for more details)

The data from Figure 1 illustrates the potential and possibly changing role of the family as a social protection mechanism and the effect of this on the distributive effects of policies. Reforms to the Greek pension system (see Karagiannaki 2003) have served in part to target resources on poorer pensioners and have had the effect of increasing the independent incomes of the old. If resources are shared equally within the household, however, we could see such increased state transfers as replacing the support to the elderly given by their extended families given the high incidence of multigenerational households. Rather than taking resources away from the young and given them to the old, we should then see these reforms as taking resources away from families who do not care about their elderly relatives and giving them to those who do.

The aim of this paper is thus to test the restriction that household members pool their resources. The structure of the paper is as follows. The next section presents the methodology. Section 3 presents the data and the results and finally section 4 concludes

2 Testing for different models of intra-household allocation.

The literature on this is extensive and really takes as its staring point the argument of Samuelson (1956) that only when households act as if there was one individual decision maker would aggregate household level demand behaviour look necessarily rational. For example changes in relative bargaining power could imply that combination A was preferred to combination B in time t, while in time t+1 B was preferred to A. The general idea is that the different processes of household level resource allocation place different restrictions on household level demands and these restrictions can be explicitly tested. The assumption of one individual decision maker (the unitary model) can be justified theoretically if a) there is a benevolent dictator within the household, b) household members care so much about each other that they are all maximizing the same utility function or c) (which is potentially the case in Greece), resource

allocations across generations are negotiated over the entire life-cycle.

Models that do not impose the restriction of income-pooling are the collective model (Chiappori 1988, 1992) and the cooperative and non-cooperative bargaining models (Manser and Brown 1980, McElroy and Horney 1981, Bergstorm 1996, Lundberg and Pollak 1993, 1994). All these models allow the bargaining power accruing to different family members to affect household level demands. The unitary model, on the other hand, suggests that this should have no effect. Tests of income pooling thus relate variables that proxy differences in bargaining power across individuals to differences in expenditures across goods[3].

Most empirical studies exploit the cross sectional variation in the relationship between the distribution of power among household members and the household allocation outcomes in order to implement their testing. The absence of data on private consumption of individual household members precludes any direct test of income pooling hypothesis. The usual methodology to handle this problem is to assume that some types of people get zero direct utility from the consumption of certain goods. Expenditure on such "excludable" goods can then be assigned to a particular household member. Several tests on models of intra-household allocation have been conducted using some gender-specific household goods. The most commonly used goods in the relevant literature are expenditures on men's and women clothing[4]. The shortcoming of this strategy is that any test conducted along these lines depends on the validity of the assumption concerning the "assignability" of such goods. For example, in the case of men and women clothing, partners may get pleasure out of seeing each other in nice clothes and perhaps more importantly, expenditures on clothing is in part a work expense and so related to income shares. The crucial issue of finding a good which can be assigned to a particular family can be addressed more effectively in the context

[3] see Altonji, et al. ([992], Bourguignon and Chiappori [1992], Bourguignon et al. [1993, 1994], Browning, M., [1995], Fortin and Guy Lacroix. [1997]. Hayashi [1995] Hoddinott and Haddad [1995] Philips and Burton [1998] Ward-Batts, [2002]

[4] Other goods that have been used in the empirical literature to test models of intra-household allocation are leisure (Schultz (1990), Fortin and Lacroix (1997)), the fertility rates and the calorie intake of the individual household members (Thomas (1990)).

of multigenerational households since the issue of inter-dependent preferences is much less of a problem among members of different families. In our first set of results we consider children clothing as a good "excludable" to young families in the sense that the elderly get no direct utility from the consumption of children clothing. Under the null that the unitary model holds any variable describing the relative power of different families should have no effect on the budget share on children clothing.

The problem then is that we have no data on relative power of household members. Several measures have been used to proxy the relative endowments of individual household members. These measures mainly reflect the control of the individual household members upon the household economic resources. Among the measures that have been widely used in the literature as proxies of the relative bargaining power of household members is both earned and unearned income. The problem with this strategy is that these variables are partially driven by current and past choices over present and future consumption and leisure[5]. Changes in these variables are as likely to be driven by measurement error and the predetermined work and leisure choices as they are by changes in endowments. Several studies tried to test the income-pooling hypothesis (Thomas (1990), Schultz (1990), Phipps and Burton (1998), Bourguignon, Browning, Chiappori, Lechene (1993)) using income sources that can be considered endogenous. Although suffering from several drawbacks we use the share of household income controlled by each family as a proxy of their bargaining power. Under the assumption that differences across households in the relationship between bargaining power and our proxy of income share are not systematic, however, the qualitative relationship will be meaningful. The fact that pensioner incomes are determined in part by state policy towards the old and that these policies have changed over time gives us a good source of exogenous variation in the income shares between the elderly and the young.

To implement our testing we estimate Engel curves to relate the budget

[5] The only studies that have used an exogenous variation in income to test income pooling are those of Lundberg, Pollak, and Wales (1997), Wards-Batts (2000) and Attanasio and Lechene (2002).

share of children clothing to the distribution of the elderly income share. More specifically we estimate the following equation:

$$w_i = z_i'\alpha + \beta \log C + \gamma \rho_i + \varepsilon_i \tag{1}$$

where w is the budget share of children clothing of household, z is a vector of household specific characteristics such as the age of young and old family the number of children and the labour market status of the members of young and old families, C is the households' consumption expenditures and ρ is a variable describing the elderly family income share. In order to deal with the measurement error bias resulting from the endogeneity of total consumption expenditures we estimate equation (1) using two-stage least squares instrumenting the log consumption expenditures with log household income.

Two major weakness of this strategy are first that we have to focus our analysis on those that have dependent children living in the household[6] and second that the infrequency of clothing expenditures may lead to a high percentage of zero shares in our data. Below we show how we can complement our analysis by looking at the full sample of multigenerational households. We can deal with the second problem by using a Heckman (1976) sample correction to control for the selectivity bias induced by this infrequency. We exploit seasonality of expenditures as a source of variation in whether people are recorded in making any expenditures that is uncorrelated with the actual level of expenditure.

It is important to stress that our results here depend on the assumptions a) that those households with dependent children are representative of the population of multi-generational households over all and b) that the elderly gain no direct utility from having their grandchildren dressed in nice clothes. They should only care about their grandchildren's consumption of clothes insofar as they make their grandchildren or their children better off. We thus next discuss a different method of testing income pooling.

[6] We exclude the very few cases that the old family have under age children

2.1 Parametric tests of income pooling

Although expenditure shares on children's clothing provide an intuitive means of testing the income-pooling hypothesis amongst multigenerational households, the numbers of multigenerational households with dependent children is both small in absolute terms (leading to imprecision of estimates) and relative to the numbers of multigenerational households in total (leading to concerns about sample selection and the generality of results). The unitary model has unique predictions about the determinants of expenditure patterns of all goods, however, and so it should therefore be possible to test for income pooling on the whole sample. Lewbel et al (op. cit.) and Hayashi (1995) explore the idea of using information on single households to test income pooling. The general idea is that when the elderly have more bargaining power, households expenditures should look closer to those of elderly persons living by themselves. This is the route we follow in this next section.

To illustrate our approach, consider the case with no scale economies and where expenditure shares are linear in log expenditure. Engel curves for singles for good g are given by:

$$w_{ig} = z_i' a_g + \beta_g \ln C_i + \varepsilon_g O_i + \eta_{gi} \tag{2}$$

where the notation is as above and O is a dummy variable equal to one if the single is old and zero otherwise

Put these two single people (one young one old) in the same house and allocate α_h of the resources to the old person and $1-\alpha_h$ to the young, then the budget share becomes:

$$\begin{array}{c} w_{hg} = z_h' a_g + \beta_g \ln C_h \\ +\alpha_h \varepsilon_g \\ +\beta_g \left[\alpha \ln a_h + (1-\alpha_h)\ln(1-\alpha_h)\right] \\ +\bar{\eta}_{gh} \end{array} \tag{3}$$

[subscripts h now denote households].

If we differentiate with respect to α we can see what happens to expenditure shares when we give more resources to the elderly

$$\frac{\delta w_{hg}}{\delta \alpha} = \varepsilon_g + \beta_g \left[\ln \alpha_h - \ln(1-\alpha_h)\right] \tag{4}$$

If either $|\beta| > 0$ or $|\varepsilon| > 0$ then this expression will be non zero suggesting that shifts in relative bargaining power will result in shifts in demand even conditional on total expenditures.

2.1.1 Is α identified?

The simple answer is no, at least not with further restrictions.

First equation (4) is not monotonic Intuitively when resources are transmitted from the young to the elderly there are two countervailing effects. First the consumption patterns of the elderly have a higher weight, leading in this case to a *fall* in the budget share. Second the elderly are now getting richer perhaps leading at high levels of the elderly share in total household resources to an *increase* in the budget share as α increases.

Formally, consider the case where the good is a luxury ($\beta > 0$) and liked by the young more than the old ($\varepsilon < 0$), then $\frac{\delta w_{hg}}{\delta \alpha} < 0$ implies

$$\ln(1-\alpha_h) - \ln a_h < \frac{\varepsilon_g}{\beta_g} \tag{5}$$

thus there will be regions where the same budget share is consistent with more than one value of α.

Second, we have abstracted away from scale economies which will be present in our data. In the presence of scale economies, equation (3) becomes

$$\begin{array}{c} w_{hg} = z_h' a_g + \beta_g \ln C_h + \beta_g \ln \rho_h \\ +\alpha_h \varepsilon_g + \beta_g \left[\alpha \ln a_h + (1-\alpha_h)\ln(1-\alpha_h)\right] + \bar{\eta}_{hi} \end{array} \tag{6}$$

where ρ_h is the equivalence scale for household h. Although this does no more than shift equation (3) up and down, it means that α is not identified given the unobservability of ρ_h.

2.1.2 Our approach

Given some structure on the determination of ρ and α, it should be possible to estimate equation (6) structurally. This is not the approach we adopt in the empirical work. We simply use data on singles to estimate how the budget share will change with α. We then estimate how the budget shares change with our proxies for relative bargaining power. If the two effects appear to have a similar functional form, we can then argue that the collective model provides a better fit of the data than the unitary one.

We now move on to describe our results

3 Data and Results

3.1 Data description

The data used for this study are all publicly available Greek Household Budget Surveys (GHBS) conducted by the National Statistical Service of Greece (NSSG) for sample years 1974, 1981/82, 1987/88 and 1993/94 and 1998/99[7]. The surveys are carried out during the year and collect information on each household's income, expenditures and their components as well as information on many other household characteristics including the education levels and working status of all household members above the age of 16. The GHBS gather consumption information on a great number of goods. Most expenditure data are gathered on household basis while income information and demographic characteristics are collected on individual basis. Since the notion of the household in the survey is broad sampled households very often consist of two or even more different families living together[8]. For the purpose of our study we distinguish among the different families using the demographic information concerning the labour market status, the age and the marital status of each members of the household. The sample used in this paper to test income pooling includes households

[7] Since the surveys 1981/82, 1987/88, 1993/94 and 1998/99 are mainly conducted in the second year we refer to them thereafter as 1982, 1988, 1994 and 1999 HBS.

[8] The family within this framework is defined as single person or a couple with or without dependent children. Karagiannaki (2003) provide more details on the issue of how each family have been distinguished in each household

Table 1: Distribution of household types for two-generational households

Household Type	**1974**	**1982**	**1988**	**1993**	**1999**	**ALL**
Young single, Elderly single	13.02	14.54	16.20	20.28	24.83	17.01
Young couple, Elderly Single	50.00	46.07	42.57	32.57	31.46	41.91
Young Single, Elderly Couple	16.63	18.66	23.16	31.49	31.97	23.22
Young couple, Elderly Couple	20.34	20.72	18.07	15.67	11.73	17.85
Total Number	1052	777	747	651	588	3815

consisting of both young and old families (5071) but excludes those households with more than two families leaving us with a final sample of 3815.

Although the proportion of elderly living with non-elderly has changed dramatically over the last 25 years it still remains high. In the early 1970s the proportion of elderly living with non-elderly persons was about 58 percent. This figure has fallen to about 32 percent in 1999. This decreasing trend may be attributed both to the improvement of the independent pension income of the elderly as well as to more cultural effects leading to changes in the household formation process. Table 1 shows the distribution of household types for the 3815 two-generation households for each year separately as well as for the full sample. About 60 percent are households of single elderly living with their grown up children (either singles or couples).

Significant changes in the distribution of household types have occurred over time. In early years multigenerational households consisted mainly of single elderly living with young couple. In later years the percentage of this type of households decreased significantly (from about 50 percent in 1974 to about 32 percent in 1999) while the percentage of households consisting of couple elderly living with single young (from about 16 percent in 1974 to about 32 percent in 1999) increased.

3.2 Results using expenditure shares on children's clothes

Table 2 presents the results for the restricted sample of households with positive expenditures on children clothing as well as the full sample of multigenerational households with underage children treating the zeroes as missing observations and controlling for sample selection bias. We first present the results for the restricted sample of households with positive expenditures on children clothing. According to the results of this model we reject the null that parameter estimate of the variable indicating the distribution of income within household has no effect on the budget share of children clothing. The parameter estimate of the elderly income share suggests that the budget share of children clothing decreases with the share of elderly income. This result suggests a strong rejection of the income-pooling hypothesis.

Concerning the effect of the other variables, the log consumption expenditure has a negative significant effect on the budget share of children clothing while the age of the head of the young family has a positive effect on the budget share of children clothing. The budget share of children clothing is increasing with the number of under-age children while decreases with the number of older children. The house ownership and the variables controlling for the labour market status of the members of young and old family does not appear to have any significant effect. The parameters estimates for the variables controlling the family type suggest considerable differences across different family types in the budget share of children clothing. The year dummies show that a significant increase has occurred over time in the budget share of children clothing.

The results of two-step sample selection model (effectively three-step after instrumenting consumption expenditure with household income) do not suggest sample selection bias for households with positive expenditures on children clothing. The -statistic on the coefficient for the Mill-ratio does not allow us to reject the null of no correlation and the parameter estimate for the elderly income share is very similar to that of the one obtained using the restricted sample of households.

Table 2:

	2SLS for +ve obs		Sample selection Model			
			1st stage probit		Share equation	
	β	z	β	z	β	z
Log Consumption Expenditure	-0.035	-5.670	0.382	3.540	-0.034	-5.090
Age of young family head	0.001	1.730	-0.006	-0.960	0.001	1.700
Age of elderly family head	0.000	1.410	0.006	1.040	0.001	1.650
Number of children less than 15	0.011	4.800	0.041	0.930	0.011	4.430
Number of children more than 15	-0.017	-3.970	-0.187	-2.400	-0.016	-3.430
Whether live in owner occupied House	0.002	0.490	0.003	0.030	0.002	0.520
Labour status head young family	0.001	0.150	0.024	0.190	-0.000	-0.010
Labour status wife young family	0.006	1.730	0.029	0.390	0.006	1.620
Labour status head old family	-0.009	-1.230	0.214	1.400	-0.009	-1.100
Labour status wife old family	0.010	0.970	-0.044	-0.220	0.011	1.040
Young couple-Old Single	-0.023	-2.020	0.137	0.690	-0.024	-2.020
Old couple-Young Single	-0.005	-0.300	-0.158	-0.570	-0.001	-0.060
Old couple-Young couple	-0.023	-1.990	0.119	0.580	-0.023	-1.970
Share of elderly income	-0.024	-2.270	-0.131	-0.660	-0.027	-2.480
Year 1982	0.011	2.090	-0.052	-0.500	0.011	2.090
Year 1988	0.022	3.730	-0.071	-0.630	0.020	3.480
Year 1994	0.015	2.320	-0.029	-0.230	0.014	2.120
Year 1999	0.003	0.450	-0.204	-1.530	0.004	0.520
Winter					0.164	1.650
Spring					0.074	0.690
Autumn					0.225	2.290
Christmas and Easter					0.299	3.700
Constant	0.459	5.560	-4.974	-3.500	0.446	4.670
Mills lambda					-0.014	-0.790
Rho						-0.263
Sigma						0.055
Obs 1542						

Note: The base category for family type is the young single-old single. The base year is 1974 and the base variable for season of interview is summer.

The results from table 2 clearly indicate a rejection of the hypothesis of income pooling. The coefficient on the elderly income share has the expected sign and is significant. We next use parametric methods to test income pooling for the sample of multigenerational households overall.

3.3 Further tests of income pooling hypothesis

In order to extend our analysis using the full sample of multigenerational households we exploit generational differences in taste for the consumption of certain goods exploiting the information of consumption patterns of nuclear households. After uncovering differences in preferences of the two cohabiting generations we can assign the consumption of the respective good to the specific family and test income-pooling hypothesis. It is important to stress that the differences in preferences among young and old households can be used as consistent estimates of the differences in the preferences insofar household formation is exogenous. In order to uncover intergenerational differences in preferences we estimate Engel curves for the demand of meals out and clothing using the sample of nuclear old and young households. In other words we take equation (2) to the data

Equation (2) is again estimated using instrumental variable estimation to handle the endogeneity of total consumption expenditures. The results are reported in table (3) The t-statistic of the taste shift parameter elderly in both equations suggests that there are considerable generational differences in the expenditure patterns of both these goods. The negative coefficient in both equations suggests that both these goods are more preferred by the young than the old. The budget share of meals out is on average 0.033 less for the old compared to the young households while the respective figure for clothing is about 0.025.

The coefficients from equation can be used together with the model described above to simulate how budget shares will change as the elderly famiily are given more bargaining power. We showed above how this could be done for the case of a young single and a elderly single living together. This can easily be done for other multigenerational household types, given certain assumptions about

Table 3: Engel curves for meals out and clothing for nuclear households

	Meals Out		Clothing	
	β	z	β	z
Log Consumption Expenditure	0.028	9.670	0.024	6.440
Single	-0.010	-3.580	0.016	4.410
Elderly (age>=65)	-0.032	-10.840	-0.025	-6.370
Single*male	0.144	52.300	-0.010	-2.840
Single*male*elderly	-0.033	-14.500	-0.013	-4.300
Labour status head	0.006	3.340	0.007	2.980
Labour status wife	0.006	4.050	0.009	4.470
Year 1982	0.033	15.170	0.008	2.860
Year 1988	0.036	15.660	0.013	4.380
Year 1994	0.037	18.200	-0.011	-4.110
Year 1999	0.055	22.930	-0.022	-6.830
Constant	-0.271	-7.900	-0.182	-3.990
Observations:23,383				

the allocation of the distribution of resources within couples. For simplicity we assume firstly equal sharing within couples and secondly that these goods (clothes and meals out) are purely private. The first assumption means we can abstract away from the determination of resource allocation within nuclear families. The second assumption implies that individual household members only care about the others' consumption of meals out and clothing in so far as it effects the utility of other household members. There are no externalities in the consumption of these goods. This means we have (in the absence of scale economies)

Young single, Old single

$$\begin{array}{c} w_{hg} = z_h' a_g + \beta_g \ln C_h \\ +\alpha_h \varepsilon_g \\ +\beta_g \left[\alpha \ln a_h + (1-\alpha_h)\ln(1-\alpha_h)\right] \\ +\bar{\eta}_{gh} \end{array} \tag{7}$$

Young couple, Old single

$$\begin{array}{c} w_{hg} = z_h' a_g + \beta_g \ln C_h \\ +\alpha_h \varepsilon_g \\ +\beta_g \left[\alpha \ln a_h + (1-\alpha_h)\ln \frac{(1-\alpha_h)}{2}\right] \\ +\bar{\eta}_{gh} \end{array} \tag{8}$$

Young single, Old couple

$$\begin{array}{c} w_{hg} = z_h' a_g + \beta_g \ln C_h \\ +\alpha_h \varepsilon_g \\ +\beta_g \left[\alpha \ln \frac{a_h}{2} + (1-\alpha_h)\ln(1-\alpha_h)\right] \\ +\bar{\eta}_{gh} \end{array} \tag{9}$$

Young couple, Old couple

$$\begin{array}{c} w_{hg} = z_h' a_g + \beta_g \ln C_h \\ +\alpha_h \varepsilon_g \\ +\beta_g \left[\alpha \ln \frac{a_h}{2} + (1-\alpha_h)\ln \frac{(1-\alpha_h)}{2}\right] \\ +\bar{\eta}_{gh} \end{array} \tag{10}$$

We then use equation (7 through 10), together with the coefficients from table 3 to show how the budget shares will change as more resources are given to the elderly within the household. These are shown in figure 2. It is important to stress here that the numbers given on the y axis here are arbitrary as the position of these curves is not identified given the unobservability of scale economies. What emerges from this graph is that as alpha increases the budget shares of both meals out and of clothing should fall and then rise. The slopes of the graphs are different across household types (although they can all be proxied by a quadratic) suggesting the importance of allowing the coefficient on the elderly share to vary.

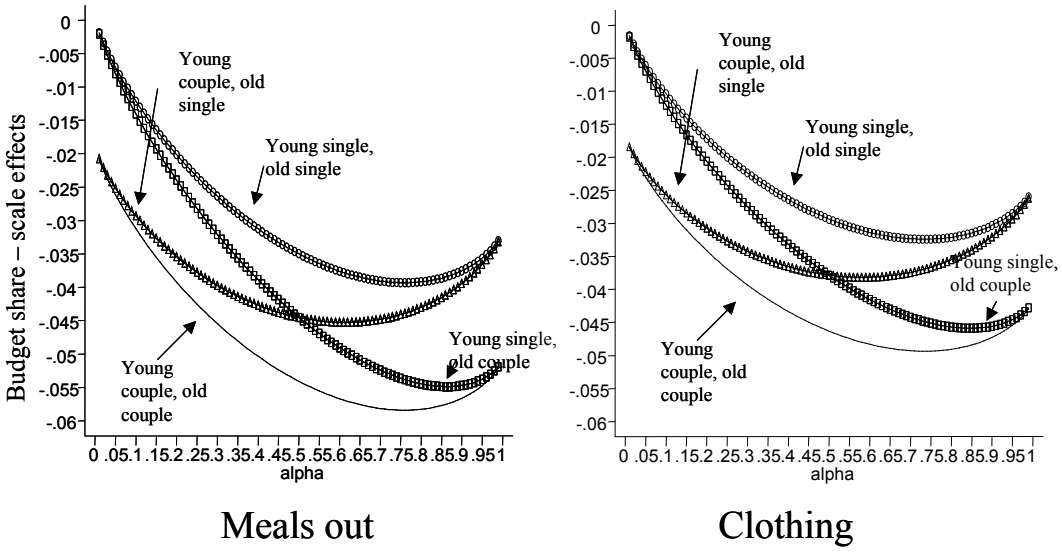

Figure 2: Collective model predictions

Table 4: Tests of income pooling by good and household type

	Meals Out		**Clothing**		**Both Goods**
	β	z	β	z	
Young single-Old Single					
Elderly share	-0.033	-1.28	0.001	0.04	
Elderly share squared	-0.004	-0.18	-0.028	-0.81	
Joint χ^2 test of share variables	$\chi^2(2) = 11.31$		$\chi^2(2) = 3.31$		$\chi^2(4) = 16.06$
	$p = 0$		$p = 0.19$		$p = 0$
Young Couple-Old Single					
Elderly share	-0.013	-0.64	-0.049	-1.65	
Elderly share squared	-0.009	-0.29	0.01	0.23	
Joint χ^2 test of share variables	$\chi^2(2) = 1.96$		$\chi^2(2) = 5.44$		$\chi^2(4) = 8.19$
	$p = 0.37$		$p = 0.06$		$p = 0.08$
Young Single-Old Couple					
Elderly share	-0.052	-1.87	0.012	0.3	
Elderly share squared	-0.001	-0.04	0.012	0.39	
Joint χ^2 test of share variables	$\chi^2(2) = 26.57$		$\chi^2(2) = 3.34$		$\chi^2(4) = 28.21$
	$p = 0$		$p = 0.19$		$p = 0$
Young Couple-Old Couple					
Elderly share	-0.022	-0.84	-0.058	-1.5	
Elderly share squared	0.029	0.96	0.006	0.13	
Joint χ^2 test of share variables	$\chi^2(2) = 0.92$		$\chi^2(2) = 7.24$		$\chi^2(4) = 8.32$
	$p = 0.63$		$p = 0.03$		$p = 0.08$
All household types					
Joint χ^2 test of share variables	$\chi^2(8) = 36.12$		$\chi^2(8) = 20.19$		$\chi^2(16) = 56.35$
	$p = 0$		$p = 0.01$		$p = 0$

Table 4 presents the results. This table presents both the individual coefficients (β) and associated z statistic of the income share and income shared squared terms. (All the results from the associated regressions are presented in the appendix) Note that these are allowed to differ both between goods and between household types as would be predicted by the theory. Looking first at the individual coefficients, the results are inconclusive. No coefficient is statistically different from zero. The quadratic relationship suggested in figure 2 will, however, only be identified if there is enough variation in the relative income shares of the elderly over the entire range of income

Figure 3 shows the distributions of elderly relative income by year in our

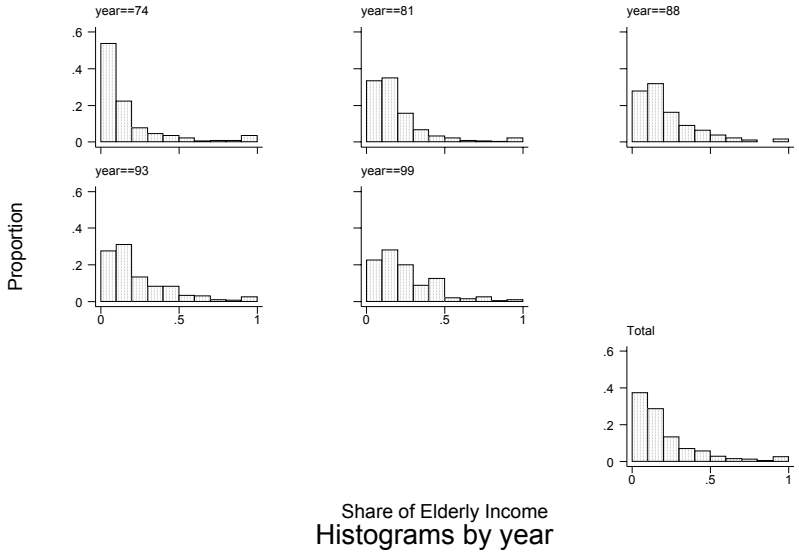

Figure 3: Distributions of relative elderly income by year

data and as can be seen we have very few observations at high levels of relative income. Thus the failure to identify the quadratic effect is could easily driven by the fact that the elderly have so little independent income.

The χ^2 tests are therefore more conclusive. The data clearly reject the hypothesis that the effect of relative elderly incomes is zero when the test is constructed all household types. The test statistic is significant for both goods individually and taken together. Looking at each household type separately, however, the situation is less clear. The strongest rejection $\chi^2(4) = 28.21$ is given for the old couple young single household type. This should not be a surprise. First figure 2 shows slopes to be much steeper for this group, second there is likely to be slightly more variation in income shares amongst this group as it will also include some young single who have yet not left home. The test for the young single-old single type is also significant [$\chi^2(4) = 16.21$] and it is this group that provides the cleanest test as we can abstract from the issue of the distribution of resources within couples. For the other two household types

the share of elderly income does not seem to have any significant effect. This could be in part a reflection of the fact that variations in α appear to be less important for these groups (see figure 2) but there is another factors that we believe to important here

This is household production. In many multi-generational households, the elderly provide services for the young (child care) and the young for the old (care when the elderly become infirm). It is the former kind of care that we believe to be important here. If it is the case that the elderly are providing (or can provide) services for the young family, then this will give them more bargaining power and hence a greater share of total resources, conditional on the distribution of income within the household. The effect of income on resource allocation will be less pronounced and the power of a parametric test like this will be that much smaller. The fact that the data clearly reject income pooling amongst those with dependent children gives further support to this idea. In addition the authors' own calculations from the GHBS show the increase in female labour supply over the 1980s to be most pronounced amongst mothers with elderly relatives living at home suggesting that these effects will be important.

In summary therefore we read the results of table 3 as providing evidence for a rejection of income pooling.

4 Conclusion

This paper addresses the question of how the allocation of resources takes place within two-generation households (consisting by both young and elderly families). To implement our testing we have followed two strategies. We first related the budget share of children clothing -which we considered as a good exclusive to young family- with the distribution of relative power within household and tested for its significance. Under the null that the unitary model holds the effect of this variable should be equal to zero. The second approach consisted in isolating differences in preferences among different generations and test the significance of the share of elderly income in the system of goods which we

found that are preferred by the member of one family. The results from both these methodologies imply that income-pooling hypothesis is strongly rejected. Despite this strong rejection of income-pooling hypothesis we find significant differences among different household types.

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Appendix Table 5

	Meals Out		Clothing	
	Coefficient	**z**	**Coefficient**	**z**
Log Consumption Expenditure	0.024	6.050	0.012	2.130
Age of young family head	-0.001	-5.490	-0.001	-1.780
Age of elderly family head	0.000	0.090	0.000	1.010
Number of children less than 15	-0.009	-5.350	0.009	3.750
Number of children more than 15	0.004	1.200	0.014	3.010
Whether live in own occupy House	0.001	0.180	0.008	1.620
Dummies for Labour status				
Labour status head young family	0.018	4.220	0.012	1.930
Labour status wife young family	-0.002	-0.470	0.007	1.410
Labour status head old family	0.012	2.220	0.017	2.090
Labour status wife old family	0.011	1.550	0.004	0.390
Household type				
Young couple-Old Single	-0.013	-1.540	0.009	0.750
Old couple-Young Single	0.022	1.740	-0.020	-1.060
Old couple-Young couple	-0.016	-1.540	0.010	0.690
Share of elderly income				
Young single-Old Single*share	-0.033	-1.280	0.001	0.040
Young couple-Old Single*share	-0.013	-0.640	-0.049	-1.650
Old couple-Young Single*share	-0.052	-1.870	0.012	0.300
Old couple-Young couple*share	-0.022	-0.840	-0.058	-1.500
Young single-Old Single*share^2	-0.004	-0.180	-0.028	-0.810
Young couple-Old Single*share^2	-0.009	-0.290	0.010	0.230
Old couple-Young Single*share^2	-0.001	-0.040	0.012	0.390
Old couple-Young couple*share^2	0.029	0.960	0.006	0.130
Year				
1982	0.045	10.680	-0.001	-0.120
1988	0.058	12.860	0.010	1.590
1994	0.055	11.880	-0.011	-1.580
1999	0.071	14.180	-0.027	-3.690
Constant	-0.208	-3.970	-0.068	-0.900
Wald statistic for the joint significance of elderly income share variables			**χ^2 (16)=56.35 *p*-value=0.000**	
Observations:3,535				