Elderly Relative Power and Household Expenditure Patterns : Evidence from Senegal

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Abstract

This paper uses Basu's extension of the collective model to identify what determine the relative power of the elderly within Senegalese households and to recover the impact of such a power on household's decisions of expenditures. Elderly power is measured using the old people's share in household total earnings. We use a 3SLS estimation procedure to estimate the elderly power endogenously and simultaneously with household budget shares. Estimates indicate that the elderly relative power has significant effects on households' budget shares. We obtain a clear picture of these effects using the estimated parameters to conduct simulations based on shifting resource control within the household. The graphs depicting the relationship between the budgets shares of expenditures and the elderly relative power are typically non-monotonic, varying significantly across items. Changes in generation-specific control of resources within household likely translate into changes in household expenditure patterns.

JEL Classification : J 14, D 13, D 31, O 55

Keywords : Elderly Power, Expenditure Patterns, Collective Model, Senegal.

1 Introduction

Evidence on family living arrangements in Senegal indicates that people often live in large and multigenerational households. Data from the 1995 household survey report that a household, on average, comprises 12 members of which 5 are children, 5 young adults and 2 older people. By living together, people presumably bargain over labor supply and commodity expenditures, with consequent implications for household welfare including investment in children's health and education. In this chapter, we examine how interactions between individuals within the household affect the expenditure patterns, focusing particularly on the role of the elderly. We explore if shifting resources control towards the elderly result in differential expenditures patterns by the household. The interest in this issue stems from two points. First, evidence indicates that poverty is more pervasive amongst households comprising older people and children in Senegal like in most African countries (Kakwani *et al.*, 2004). Second, as shown in chapter 1, children outcomes change positively and significantly with rising household income. Then, to improve the human capital of children and also reduce poverty, we suggest to introduce a transfer program targeting the elderly. However, how this transfer translates into an effective tool of redistribution and fighting poverty, reaching simultaneously the elderly and the children, depends on the sharing rules in place within the household.

Traditionally, the household was treated as an unit of analysis with the aggregation of preferences according to some rule. The best known of these models is Becker's (1981) approach that invokes the idea of "altruism" or "benevolent dictator" to aggregate preferences. However, there are several issues (e.g. preferences heterogeneity among household members, differential control of resources, etc.) that the traditional approach, known also as the unitary model, cannot address. This encouraged the development of alternative models that were less restrictive. These alternative models explicitly recognize that the household is a collective framework comprising individuals with different preferences, constraints and opportunities. Different decision procedures are then proposed, ranging from axiomatic bargaining models to non-cooperative models (Haddad, Hoddinott and Alderman, 1997). Amongst these models, one of the most prominent is the collective setting. The collective model assumes that within household, however decisions are made, the outcomes are Pareto efficient; but the model does not impose a particular solution concept (Chiappori, 1988 and 1992; Browning and Chiappori, 1998).

The collective model can be implemented by assuming that the household has a welfare function that is a weighted sum of the individuals' private utility functions. The Pareto weight in this function may depend on prices and the household's total expenditures and on variables that do not enter the individual preferences. These variables are usually termed "distribution factors". In this function, individual welfare weights capture the bargaining power of each household member. The concept of bargaining power plays thus a crucial role in the model. The model predicts that the household decision process and the resultant outcomes will reflect the bargaining power of the individual. However, measuring the concept is not trivial. Individuals derive bargaining power from multiple sources. Examples that have been used in empirical studies include the sex ratio in the surrounding population, the ownership of current assets, the assets at marriage, the inherited assets, the distribution of income within the household, etc.

One distinctive characteristic of the proxies for the bargaining power is that they are assumed exogenous to household decision making. This assumption is problematic, particularly when one considers labor income as proxy for bargaining power. The reason is that labor income reflects time allocation and labor force participation decisions. Labor income is likely then the outcome of a bargaining process. This is an endogenous issue and can lead to biased parameters when estimating the impact of labor income on household's decision. Basu (2001) discusses this issue and proposes a new setting which captures simultaneously the impact of the bargaining power on household decision making and the effect of household decisions on the bargaining power. It is, however, noteworthy that Basu's setting violates the efficiency assumption. People typically work more than is efficient because of their apprehension that to work less would amount to a diminished bargaining power. To avoid the endogeneity problem, Bourguignon *et al.* (1993) assume fixed labor supply and separability between consumption and leisure. But, the assumption of fixed labor supply raises possible issues of selection.

In what follows, we look at whether the elderly people affect decisions of purchasing commodities using their share in household labor income as proxy for bargaining power. Note that we do not focus on how individuals make their decisions of labor supply. We assume that decisions occur within a game framework of two-steps. In the first step, individuals choose their amount of leisure. In the second step, they decide of the distribution of resources among individuals in the household following their bargaining power. However, we bear in mind that individuals' labor income reflects the outcomes of the household bargaining over time allocation. Thus, in our estimations, elderly share of labor income will not be treated as predetermined.

The paper is structured as follows. Section 2 outlines the collective model sharing rule due to Bourguignon, Browning and Chiappori (1995). In section 3, we present the empirical model, describe the data, discuss estimation issues, and present the regression results. Section 4 concludes.

2 The basic model

The collective model focuses on individuals within the household and relaxes the assumption of unified or aggregated preferences. The model assumes Pareto efficiency in intrahousehold allocations, but it does not assume cooperative or noncooperative behavior by individuals (Chiappori 1988; 1992; 1997). Chiappori (1992) argues that the rules governing a household distribution can be inferred by observing its external behavior (labor supply and aggregate consumption). The rules governing intrahousehold resource allocation are not assumed a-priori but estimated from the data as much as possible. In the collective model, under certain assumptions, it is possible to recover a 'sharing rule' from the expenditure data. The 'sharing rule' implicitly or explicitly defines the intrahousehold resource allocation process in the household. The four assumptions (Bourguignon, Browning and Chiappori, 1995) required to recover the 'sharing rule' are:

1. some goods are private;

2. preferences are 'caring' a la Becker, that is each individual within the household is assumed to maximize a welfare function that depends on both his own 'egoistic' utility and the utility of other household members;

3. the utility function is separable with respect to private consumption goods and consumption of public goods within the household; and

4. at least one private good is assignable (observe separate consumption by individuals within the household).

Browning *et al.* (1994) show that if the household is Pareto efficient then the objective function of the household can be expressed as a weighted sum of its members' utilities. Letting the household be comprised of two members, A and B, the model can be written as:

$$\begin{cases} \max U = \mu U^A\left(x^A, x^B\right) + (1-\mu)\, U^B\left(x^A, x^B\right) \\ \mathit{subject\ to}\text{: } p\left(x^A + x^B\right) = Y \end{cases} \tag{1}$$

where U^m is member m's utility; x^m is m's private consumption; Y is total household income; p is a vector of prices for x, and μ is the welfare weight of member A, so that the weight sums to 1 across members A and B. The welfare weight μ is a function of household income, prices and distribution factors.

Under these assumptions, the collective model can be reinterpreted as a two-stage decision process with an income-sharing rule. First, the household pools and allocates income to each member according to the sharing rule, and second, allows the members to maximize their sub-utility subject to their income constraint. The model can be written as follows. Suppose δ is the amount of income received by A and Y is total household income, then $(Y-\delta)$ is the amount received by B. Therefore, $\delta(\cdot)$ describes the 'sharing rule' and always depends on prices and total expenditures, through the budget constraint and the Pareto weight. The second stage maximization of individual sub-utilities is then:

$$\begin{cases} \max U^A = U^A\left(x^A\right) \\ \textit{subject to}: \; px^A = \delta \end{cases} \tag{2}$$

Demand equations for x are then a function of prices and δ:

$$\begin{cases} x^A = x^A\left(p, \delta\right) \\ x^B = x^B\left(p, (1-\delta)\right) \\ \text{with:} \quad x = x^A + x^B \end{cases} \tag{3}$$

If δ depends on individual incomes, y^A and y^B, there exist certain testable restrictions. Since individual incomes affect x only through δ, it must be true that the ratio of the marginal propensities to consume a good with respect to any two individual incomes (holding total income constant) is the same across all pairs of goods (Bourguignon *et al.*,1993).

$$\frac{\partial x_i/\partial y^A}{\partial x_i/\partial y^B} = \frac{\partial x_j/\partial y^A}{\partial x_j/\partial y^B} = \frac{\partial \delta/\partial y^A}{\partial \delta/\partial y^B} \tag{4}$$

In the unitary model, this ratio is equal to unity. In the collective model, the ratio represents the sharing rule and measures an individual's relative command over household resources. Both μ and δ are a function of prices, total household income, individual incomes, and other factors affecting individual's welfare weight, such as divorce laws, welfare policies, sex ratio in the marriage market and other sociocultural factors.

The distinctive feature of the collective models is that household demand is influenced by price, total income and tastes as in the unitary model, but is also influenced by factors that are related to the bargaining power of the individual.

If data are available on 'assignable' (observe separate consumption of individuals within the household) goods or 'exclusive' (can be consumed only by a specific group or individual) goods, and if there exist factors that affect δ but not x directly, the effects of these variables on the 'sharing rule' can be estimated (Browning *et al.*, 1994). It will be possible to explicitly solve for $\partial\delta/\partial y^A$ and $\partial\delta/\partial y^B$, as well as test for the constancy of the ratio across commodity pairs.

In what follows, we focus on the role of individual labor incomes on demand functions x. We also look at whether family characteristics influence household demand patterns.

3 Estimation

3.1 Empirical framework

To estimate and test a system of demand functions similar to equation (3), we estimate the following expenditure function (Lancaster *et al.*, 2003):

$$w_i = \alpha_{i0} + \alpha_{i1}\theta + \beta_{iA}\theta^2 \ln(deptet) + \beta_{iB}(1-\theta)^2 \ln(deptet) + \gamma_i H + \epsilon_i \quad (5)$$

Where:

- w_i = the expenditures share of the ith good;
- θ = the share of elderly labor income in household labor earnings;
- $(1-\theta)$ = the share of the labor income of the non-elderly members in household labor earnings
- $\ln(deptet)$ = the natural logarithm of total per capita expenditures (we use total per capita expenditures as proxy for levels of household income);
- H = household characteristics (such as size, composition, characteristics of the head of household , etc.); and
- ϵ_i = the error term.

α_{i0}, α_{i1}, β_{iA}, β_{iB}, and γ_i are the parameters to be estimated. Note that the subscript A refers to the elderly and B to the non-elderly.

Recall that, controlling for levels of household income, if the unitary model holds, individual's shares of labor income do not have any effect on household demand patterns. This implies that θ does not have any effect on w_i. A convenient way to fully capture the sensitivity of the relation between the budget shares and the elderly share of labor income is thus to focus on the derivative of equation (5) with respect to θ. The null hypothesis $H_o : \frac{\partial w_i}{\partial \theta} = 0$ constitutes then an appropriate test to verify if change in elderly's share in household labor earning θ has an impact on budget shares w_i. The test corresponds to a joint test $(\chi^2(2))$ of the following two restrictions : $\alpha_{i1} = 0$ and $\beta_{iA}\theta = \beta_{iB}(1-\theta)$.

In what follows, we discuss descriptive statistics, estimation issues and the regression results.

3.2 Data

The data used to estimate this model are taken from the first Enquête Sénégalaise Auprès des Ménages - ESAM conducted from March 1994 to April 1995 by the Direction de la Prévision et de la Statistique of the Senegalese Ministry of Finance. ESAM is an Incomes-Expenditures nation-wide survey on 3300 households collected from three strata: Dakar (the capital), other urban areas and rural areas. In urban areas, data were collected during a period of 33 days while in rural areas the proceedings took two periods of 17 days each, with six months between them. By gathering data in two rounds in rural areas, the aim was to take into account the impact of the period of harvest on consumption trend. ESAM database contains information on individuals characteristics (age, education, sex, occupation, marital status, etc.), and indications on households structure (size, composition, etc.), budget (consumptions, incomes, etc.), and wealth (housing or other assets and liabilities).

To stick to the intergenerational perspective of this chapter, we pick up from this database the households in which at least one older person co-resides with at least one adult or more. Generations are split as follows: children (less than 15 years old), adults (15-54) and elderly (55 or more). Thus, our working sample consists of 1617 households of which 1494 are composed of three generations. Descriptive statistics are reported in table 1.

In ESAM database, much of income data can be assigned to individuals. Each individual involved in agricultural activities report detailed information on his activity including answer to question on how much he gains from this activity. Thus, this amount of money is assigned to him as labor income from agriculture. This is not necessarily the head of household or the holder of the activity (land, cattle, forestry, etc.). Moreover, wage income and revenues from non agricultural activities are also collected at the individual level. We obtain then individual's labor income by summing up wage employment and net revenues of self-employed from crops, livestock and non-agricultural and small business activities. To obtain total labor earning of one generation within the household, we aggregate the labor income of individuals composing this generation. From table 1, we find that labor income represents almost 32 percent of total household income. We also find that of total household labor earnings, 44 percent accrue to the elderly. Of this, 42.37 percent are from agricultural activities, almost 22 percent from small and other informal business, 15 percent from pension, etc. (see table 2). Note that salaries earned by the elderly as employed or pieceworkers represent only 6 percent of their labor income. This contrasts with the case of the younger adults for whom wage income constitutes more than one third of their labor income (36 percent).

We aggregate data expenditures into eight categories. These are: food at home, clothes, health, education, furniture, housing, transport and other expenses which include food out, recreation, cosmetics, etc. Food at home excludes imputed value of subsistence consumption. It dominates the total expenditures of the household in our sub-sample, with 59 percent. This is slightly higher than the figure for all households (54 percent) or what households without elderly spend for food (52 percent). This likely reflects the higher poverty status of households comprising elderly people (Engel law). Among non-food items, housing accounts for 20 percent. These include reported or imputed rent value, expenses for electricity and current water, and other fees for maintenance. Expenditures for clothing accounts for 7 percent and 4 percent for furniture. The latter includes expenses on equipment, durables and semi-durables. Expenditures for health consist mainly of fees for access to health facilities and expenses for medicines. On average, only 3 percent of the total expenditures of the household are devoted to this item. However, we must bear in mind that such an amount is likely to under-estimate how much Senegalese households spend for their health. The reason is that expenses for services from traditional practitioners are rarely reported. The category "other items" consists of expenditures for leisure, entertainment, food out and ceremonies (like baptims, weddings, funerals, religious events, etc.). It accounts for 4 percent of the total expenditures of the household. The remaining of household budgets is spent on transport (2 percent) and education (1 percent). The low amount spent on education is likely to reflect both the gratuity of schooling in Senegal and the low level of school enrollment among children (see chapter 1). Thus, there are a large number of households who reported zero expenditure in education (40 percent of our sub-sample).

Table 1 reports also indications on joint non-labor income, transfers received by the household and land owned by the household. Joint non-labor income is comprised of the imputed rent on owner-occupied housing, interest income, income from financial investment and rental income. It accounts for almost 52 percent of total household income. In our estimations, following Thomas and Chen (1993), we use joint non-labor income as excluded instrument i.e. as potential instrument for elderly share of labor income. Our set of excluded instruments also includes transfers received by the household and land owned by the household. Note that, within Senegalese society, land tenure arrangements confer a prominent role to the elderly, particularly in rural areas.

Table 1: Descriptive statistics

Variables	Mean	Standard error
Expenditures shares (percentage)		
Food	59.49	15.68
Clothing	07.06	04.77
Housing	19.89	12.00
Health	02.94	03.84
Transport	02.28	03.28
Education	01.00	01.44
Furniture	03.85	03.36
Other expenses (food out, recreation, etc.)	03.86	04.12
Income		
Ln per capita expenditure	11.95	00.87
Share of transfers (%)	16.30	17.65
Share of labour income (%)	31.56	26.66
Share of joint non-labor income (%)	52.14	28.01
Elderly share of labour income (%)	44.01	41.79
Household composition		
Ln household size	02.28	00.61
Share of male, 0-14	20.12	13.74
Share of female, 0-14	19.89	12.93
Share of male, 15-54	18.79	13.56
Share of female, 15-54	24.53	11.79
Share of male, 55+	07.93	11.01
Share of female, 55+	08.74	11.90
Share of households in sites		
Dakar	25.42	43.55
Other cities	26.16	43.96
Rural	48.42	50.00
Land ownership by households		
Share of households with no land	44.09	49.66
Share of households with land (01-10 ha)	39.46	48.89
Share of households with land (10+ ha)	16.45	37.08
Sample size	1617	

Source: ESAM, 1994-95

Table 2: Labor income reported by source

Sector	Elderly	Non-elderly
Agriculture	42.37	23.73
Non-agricultural enterprises	10.74	16.78
Employment wages	06.07	36.91
Small and informal business	21.69	19.86
Pension	15.65	00.89
Other sources	03.65	01.83

Source : ESAM, 1994-95

3.3 Econometric issues

Estimating expenditure share equations without accounting for potential endogeneity of regressors would lead to biased estimates. For example, in equation (5), variables involving the elderly share of labor income (θ) are potentially endogenous. Therefore, to account for that, we use the instrumental variables (IV) or two-stage least squares (2SLS) procedure. In our estimation strategy, several diagnostic tests are conducted to assess the reliability of the IV estimates.

We first establish the endogeneity of the variables involving the elderly share of labor income using as instruments the joint non-labor income, transfers received by the household and land owned by the household. The issue of endogeneity is usually discussed in the context of the Durbin-Wu-Hausman (DWH) tests, which involve estimating the model via both OLS and IV approaches and comparing the resulting coefficient vectors. A Hausman statistic for a test of endogeneity in an IV regression is formed by choosing OLS as the efficient estimator and IV as the inefficient but consistent estimator. The test statistic is distributed as χ^2 with K degrees of freedom, this being the number of regressors being tested for endogeneity. However, the test is perhaps best interpreted not as a test for the endogeneity or exogeneity of regressors *per se*, but rather as a test of the consequence of employing different estimation methods on the same equation. Moreover, the use of Hausman to test regressors for endogeneity in the context of heteroskedasticity robust sometime generates negative test statistics, and then the degrees of freedom printed out for the statistic are wrong. To avoid these problems, we use the C-statistic to test for the endogeneity of the regressors as suggested by Baum, Schaffer and Stillman (2002). The C-statistic is computed as the difference between two Sargan-Hansen statistics: that for the restricted and fully efficient regression, versus that for the unrestricted, inefficient but consistent regression. The C test is χ^2 distributed, with degrees of freedom equal to the number of suspect instruments being tested. It is performed by using the procedure written by Baum *et al.* (2002) for

STATA.

We also look at if our instruments are "good instruments" by testing whether they are relevant and valid. A test for relevance of the instruments is presented using the Anderson canonical correlations LR test of whether the equation is identified. The test is basically a check of relevance of the excluded instruments (the exogenous variables not included in the second stage regression). The test statistic is built under the null hypothesis that the rank of the coefficients matrix in the reduced form equation is $K-1$, where K is the total number of included and excluded regressors. The statistic is a measure of the instruments relevance (i.e. the correlation with the part of the endogenous regressors that cannot be explained by other instruments), so a rejection of the null hypothesis indicates that the model is identified and that the instruments are relevant. We also use the "partial R^2" statistics reported in the first-stage regressions, taking into account the presence multiple endogenous regressors in the equations. This is done by applying the procedure described in Shea (1997). The "partial R^2" statistics complement the information about relevance of the instrumentation procedures.

To check for the validity of the instruments, we use the test of over-identifying restrictions. The null hypothesis is that the excluded instruments are not correlated with the error term (i.e. that they are "correctly" excluded from the equation). As we estimate the models using robust standard errors, we employ Hansen's J-statistic, which is distributed as χ^2 with degrees of freedom equal to the number of over-identification restrictions $(L-K)$, where L is the total number of exogenous regressors and K the number of exclusion restrictions (over-identified instruments). Note that we also test for the presence of heteroskedasticity in the data since this is common in cross-section data. Then, when endogeneity is not established and heteroskedasticity was found present, we use heteroskedasticity corrected OLS estimates.

Furthermore, since a substantial number of households have reported no expenditures for education, we re-estimate this dependent variable taking into account its censored character. To this end, we use Joseph Harkness' "*ivtobit*" regression for STATA. We test for the endogeneity of the instrumented regressors using the Smith-Blundel test.

3.4 Results

The IV regressions for the different expenditure shares are reported in Table 3. Table A1 provides the OLS estimates. Note that estimates are reported heteroskedasticity-robust. We report both the Hansen-J and

C-statistics after the IV regressions. Wald tests for the joint test of the significance of the elderly share of income are reported at the bottom of table 3.

Results in table 3 appear to satisfy the assumptions underpinning the estimation technique. The set of over-identified instruments appear to be good predictors of the instrumented variables. First, the Anderson canonical correlations LR statistic is 15.631, which implies we are unable to reject the null hypothesis at the 5% significance level and suggests then the relevance of the excluded instruments. Second, the F-tests of the excluded instruments in the first-stage regression are all significant at the 1% level, rejecting strongly the hypothesis that the excluded instruments are unrelated to the instrumented variables (see table 4). Moreover, the C-statistic for the exogeneity test validates the hypothesis of endogeneity of our instrumented regressors. The values of the Hansen-J statistic also indicate that the instruments satisfy the orthogonality conditions required for their employment. Thus, the most appropriate estimates are those from the IV regressions. This is what we use in the subsequent discussions.

The IV estimates from table 3 indicate that θ, the elderly share of household earnings, affects significantly the expenditure shares of almost all the different items except for "Food" and "Clothing". However focusing only on the coefficient estimate of θ would be misinterpreting the results. We should keep in mind that the variable θ affects expenditures shares in two ways: directly and through the share of the household total income given to each of the two generations ($\theta\mu$ and $(1-\theta)\,\mu$). Therefore, we should look at the simultaneous effects of all the terms involving θ. To this end, we conduct for each expenditure item the joint test: $\alpha = 0$ and $\beta_A\theta = \beta_B\,(1-\theta)$; the null hypothesis being that the elderly share of household earnings has no effect on the expenditure shares of the different items. The results of the wald tests at the bottom of the table 3 indicate that the null hypothesis is always rejected, except for expenditure in "Health". This supports then the argument that the elderly share of household earnings has significant effect on household expenditure patterns.

To obtain a clear picture of how change in θ affects expenditure shares, we look at how the relationship is graphically depicted. It is worth highlighting that the graphs would resemble horizontal straight lines if θ did not have an impact on b^g. In figure 1, we present the predicted values of expenditure shares as θ varies over the interval $[0, 1]$.

Table 3: Household expenditures shares, IV estimates

	food(iv)	cloth(iv)	furn(iv)	health(iv)
Endogenous regressors				
Elderly labor income share, θ	-2.121	-0.887	0.618**	0.349*
	(1.611)	(0.852)	(0.281)	(0.209)
(Ln per cap expenditure)*θ^2	0.008	0.033	-0.022	-0.014
	(0.079)	(0.042)	(0.014)	(0.009)
(Ln per cap expenditure)*$(1-\theta)^2$	-0.158**	-0.032	0.031***	0.015*
	(0.066)	(0.032)	(0.011)	(0.009)
Demographic characteristics				
Ln household size	-0.110***	0.022***	0.002	0.015***
	(0.024)	(0.008)	(0.005)	(0.003)
Share females, 0-14	0.256	0.000	-0.039	-0.103***
	(0.159)	(0.083)	(0.029)	(0.037)
Share males, 0-14	0.260*	0.002	-0.047*	-0.110***
	(0.147)	(0.077)	(0.028)	(0.037)
Share females, 15-54	0.064	0.060	-0.038	-0.093***
	(0.174)	(0.092)	(0.032)	(0.036)
Share males, 15-54	0.129	0.019	-0.062	-0.110***
	(0.212)	(0.120)	(0.038)	(0.041)
Share males, 55+	0.083	0.109**	-0.022	-0.044
	(0.083)	(0.054)	(0.027)	(0.034)
Location dummy (reference: rural)				
Dakar	-0.173***	0.016***	-0.000	0.003
	(0.015)	(0.006)	(0.003)	(0.003)
Other Cities	-0.166***	0.000	-0.010***	0.001
	(0.016)	(0.005)	(0.003)	(0.003)
Constant	2.582***	0.423	-0.282**	-0.092
	(0.679)	(0.307)	(0.117)	(0.092)
N	1509	1509	1509	1509
Hansen $J-statistic$	4.934	0.840	6.088	5.680
Pvalue (Hansen $J-statistic$)	0.294	0.359	0.193	0.224
C statistic (exogeneity test)	86.682	11.542	16.985	2.709
Pvalue (C statistic)	0.000	0.009	0.001	0.099
Wald joint test of the effect of θ				
χ^2 ()	13.88	5.06	5.95	3.93
Pvalue	0.001	0.080	0.051	0.140

* p<0.1, ** p<0.05, *** p<0.01

Table 3 - (continued)

	house(iv)	transp(iv)	edu(iv)	other(iv)
Endogenous regressors				
Elderly labor income share, θ	-2.262**	1.668***	0.267*	1.766***
	(1.012)	(0.643)	(0.142)	(0.509)
(Ln per cap expenditure)*θ^2	0.085*	-0.075**	-0.011	-0.068***
	(0.049)	(0.035)	(0.007)	(0.024)
(Ln per cap expenditure)*$(1-\theta)^2$	-0.106**	0.068***	0.011*	0.081***
	(0.041)	(0.024)	(0.006)	(0.022)
Demographic characteristics				
Ln household size	-0.000	-0.005	0.001	0.017**
	(0.012)	(0.009)	(0.002)	(0.007)
Share females, 0-14	-0.013	-0.143**	-0.006	-0.141***
	(0.103)	(0.067)	(0.013)	(0.051)
Share males, 0-14	0.017	-0.134**	-0.004	-0.140***
	(0.098)	(0.061	(0.012)	(0.048)
Share females, 15-54	-0.047	-0.142*	-0.004	-0.097*
	(0.111)	(0.077)	(0.015)	(0.056)
Share males, 15-54	0.043	-0.183**	-0.005	-0.168**
	(0.133)	(0.093)	(0.018)	(0.067)
Share males, 55+	0.045	-0.047	-0.003	-0.025
	(0.071)	(0.041)	(0.007)	(0.034)
Location dummy (reference: rural)				
Dakar	0.128***	0.006	0.010***	0.020***
	(0.009)	(0.004)	(0.001)	(0.005)
Other Cities	0.189***	-0.009**	0.003***	-0.002
	(0.009)	(0.005)	(0.001)	(0.004)
Constant	1.377***	-0.635***	-0.129**	-0.843***
	(0.424)	(0.242)	(0.059)	(0.228)
N	1509	1509	1509	1509
Hansen $J-statistic$	3.133	0.114	2.719	5.399
Pvalue (Hansen $J-statistic$)	0.209	0.944	0.606	0.249
C statistic (exogeneity test)	7.975	29.778	9.053	32.635
Pvalue (C statistic)	0.046	0.000	0.029	0.000
Wald joint test of the effect of θ				
χ^2 ()	6.33	7.46	6.01	12.78
Pvalue	0.042	0.024	0.049	0.002

* p<0.1, ** p<0.05, *** p<0.01

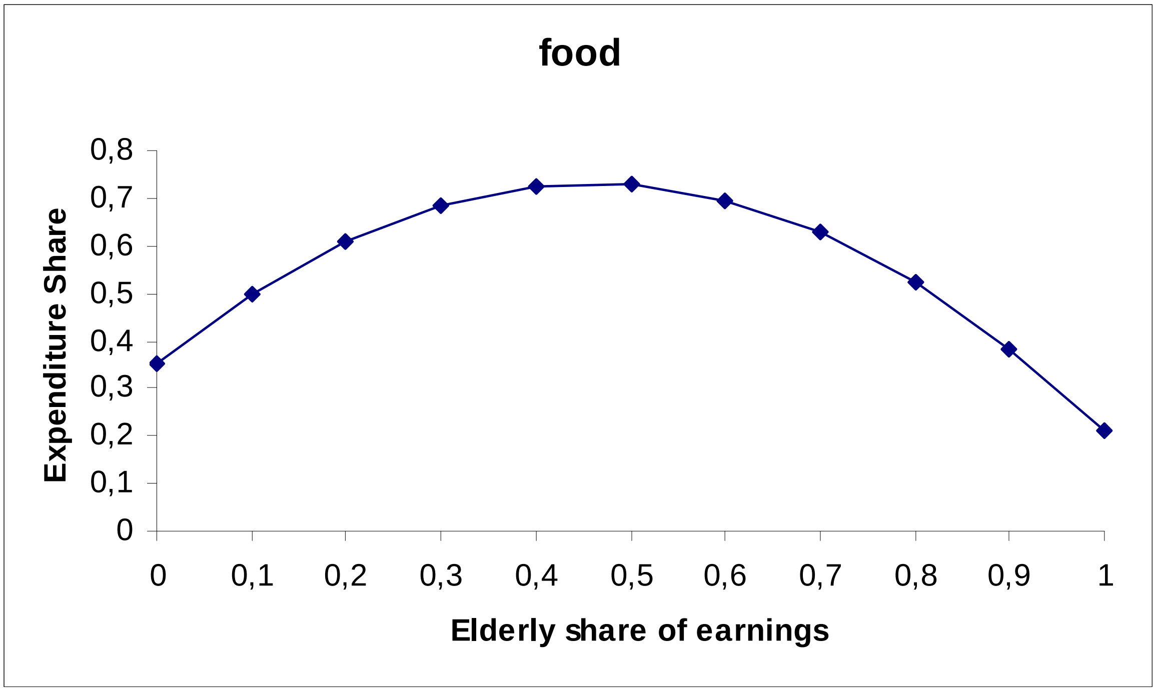
Table 4: Tests for excluded instruments

Variables	Shea Partial R^2	Partial R^2	F-test	P-value
Elderly labor income share, θ	0.02	0.23	83.17	0.00
(Ln per cap expenditure)*θ^2	0.01	0.18	65.10	0.00
(Ln per cap expenditure)*$(1-\theta)^2$	0.02	0.25	85.35	0.00
Anderson canon. corr. LR statistic		15.63		
Pvalue (Anderson canon statistic)		0.01		

The values of the other explanatory variables are held constant at their respective sample means. Graphs clearly show that the relationship between expenditure shares of different items and θ is non-monotonic as θ varies over the interval $[0, 1]$. This denotes a clear rejection of the hypothesis that elderly power does not matter on the profile of expenditure shares.

Looking at these graphs, two facts are worth stressing. First, we notice a sharp divergence of preferences between the two generations towards "clothing". The elderly consider this good as inferior while it seems superior for the younger generation. Thus, as θ tends to 1, the household share of expenditure in "clothing" decreases sharply and *vice versa* as θ goes towards 0. Second, the two generations rank identically the items "Food", "Education", "Furniture" and "Other". Thus, each of the two generations considers "Food" as an inferior good. Figure 1 shows that when θ goes towards 0 or 1, the share of the budget devoted to this good decreases. In contrast, when θ tends towards 0.5 (none of the two generations holds a dominant position), the share of resources devoted to "Food" increases. We note that, when the resources devoted to "Food" decrease, this is for increasing the expenditures shares of "Education", "Furniture" and "Other". These goods appear to be superior goods for the elderly and for the younger household members. Each generation tends to increases the part of the household budget devoted to these goods as far as θ tends towards 0 or 1.

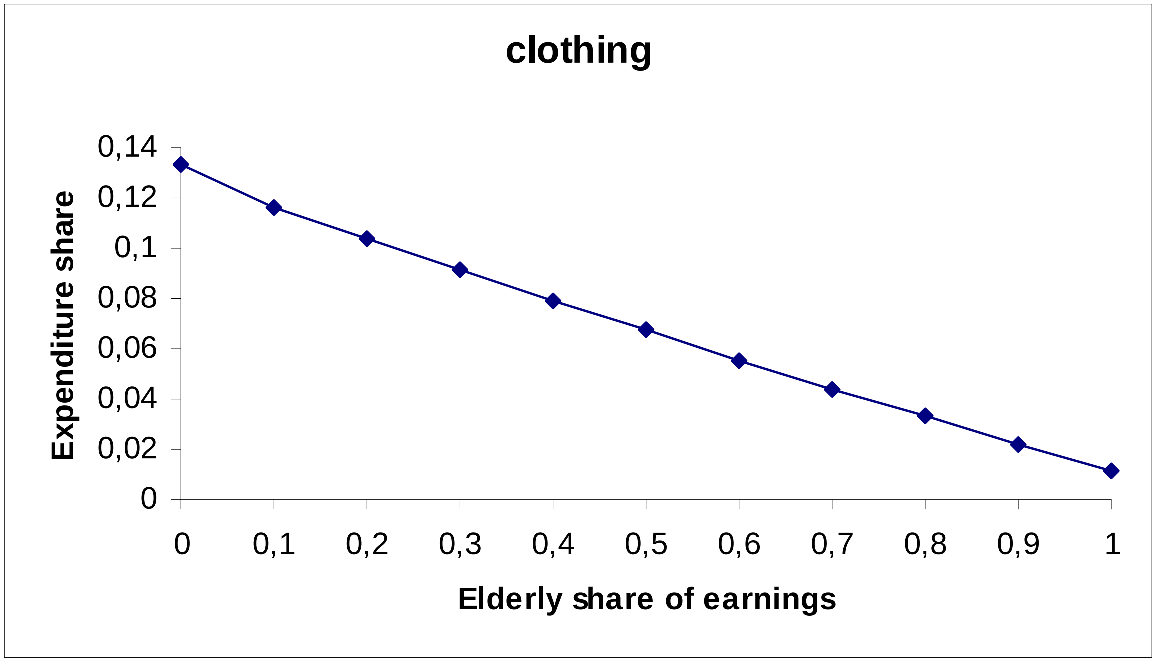
The estimates presented in table 3 are derived without taking into account the truncation of some of the dependent variable, particularly the expenditure in education. In table 5, we report the results of a IVTOBIT regression which allows both to treat the endogeneity of the instrumented regressors and to take into account the censored character of data on expenditure in education. Estimations only validate our previous findings. Testing for endogeneity using the Smith-Blundell test of exogeneity, the results confirm that for expenditures in education, our instrumented regressors are indeed endogenous. Under the null hypoth-

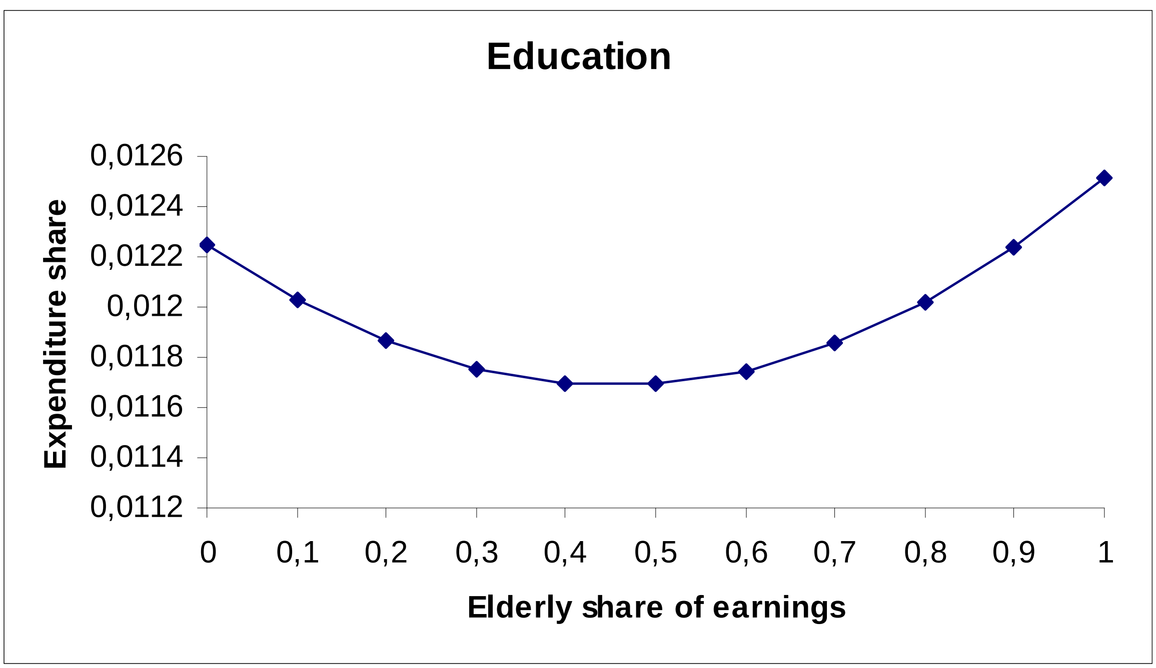


esis, the appropriate specification is that all explanatory variables are exogenous. With $F - value = 4.791$ and $Pvalue = 0.002$, we reject the null hypothesis. Then, controlling for endogeneity by applying IVTOBIT, we find estimates that are quite similar to the ones reported in table 3.

4 Conclusion

This paper aimed to investigate the whether the share of the household earnings held by the elderly members affects the expenditure patterns. Estimates report that how much the elderly earn matters on household's decision of expenditures. Tests indicate that household expenditure shares of the different items are strongly sensitive to the elderly share of household earnings. To fully capture this impact, we use the estimated parameters and conduct simulations based on shifting resource control within the household. We find that the graphs depicting the relationship between the elderly share of labor income and the expenditure shares turns out to be non-linear for most of consumption goods and vary differently across them. Thus, changes in generation-specific control of resources translate into changes in household expenditures patterns.


clothing
Expenditure share
0,14
0,12
0,1
0,08
0,06
0,04
0,02
0
0
0,1
0,2
0,3
0,4
0,5
0,6
0,7
0,8
0,9
1
Elderly share of earnings


Education
Expenditure share
0,0126
0,0124
0,0122
0,012
0,0118
0,0116
0,0114
0,0112
0
0,1
0,2
0,3
0,4
0,5
0,6
0,7
0,8
0,9
1
Elderly share of earnings

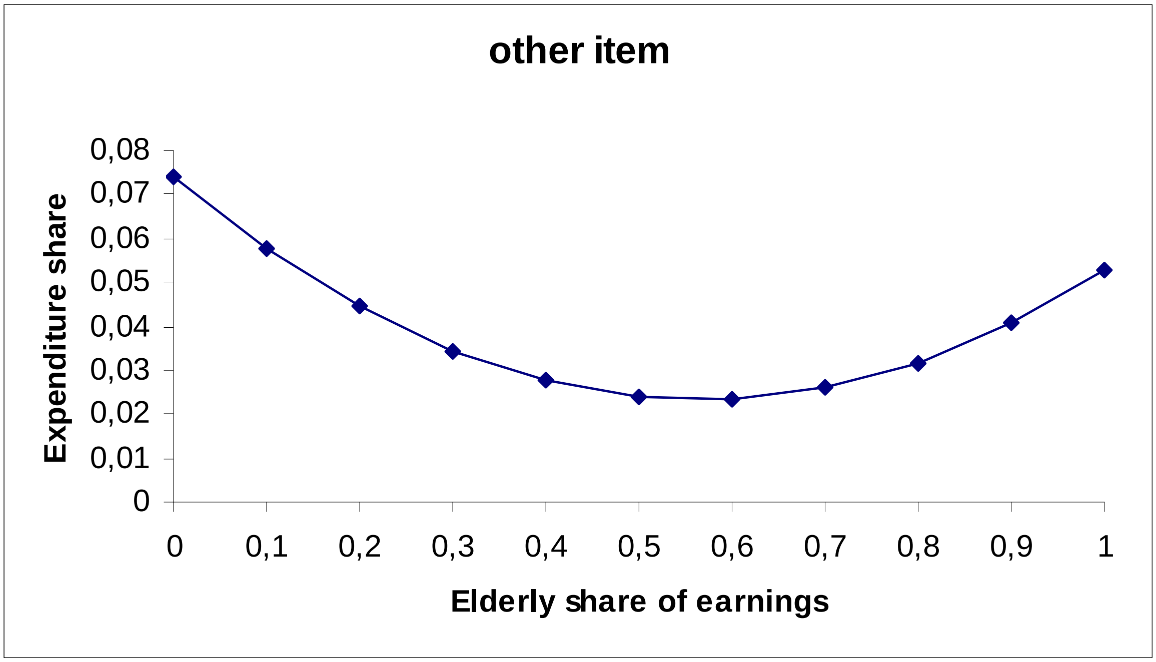
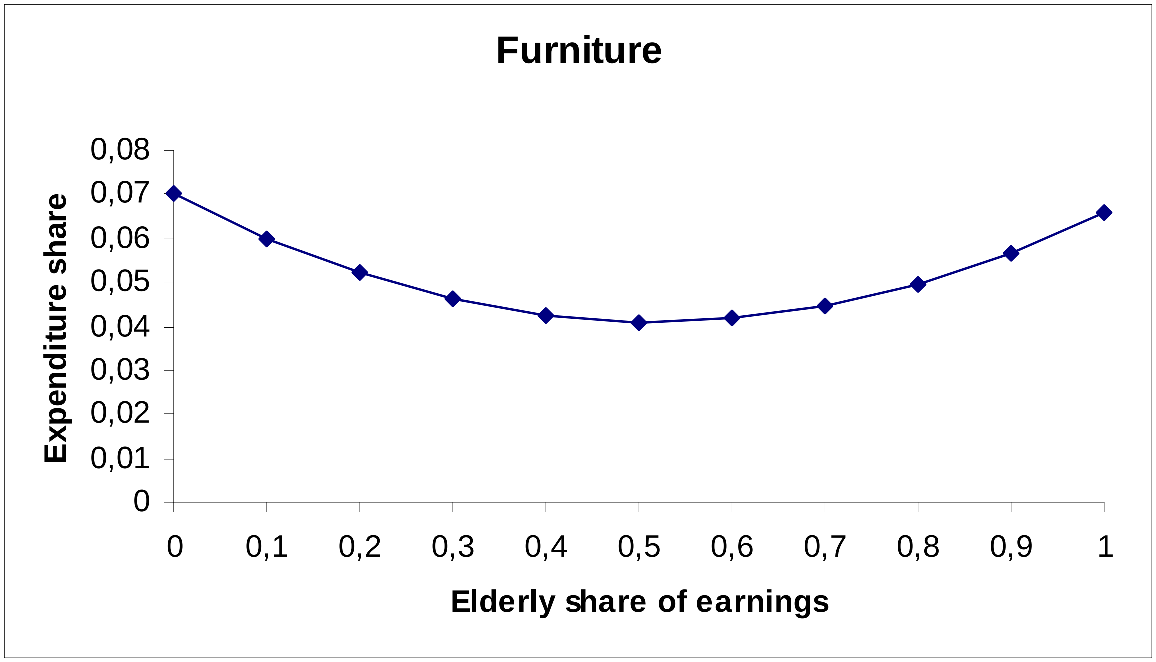


Table 5: Household expenditures share in education, IVTOBIT

	Estimates
Elderly labor income share, θ	0.393*
	(0.203)
(Ln per cap expenditure)*θ^2	-0.016
	(0.010)
(Ln per cap expenditure)*$(1-\theta)^2$	0.017**
	(0.008)
Ln household size	0.006**
	(0.003)
Share females, 0-14	0.015
	(0.021)
Share males, 0-14	0.022
	(0.020)
Share females, 15-54	0.10
	(0.023)
Share males, 15-54	0.014
	(0.028)
Share males, 55+	-0.002
	(0.013)
Dakar	0.016***
	(0.002)
Other Cities	0.009***
	(0.002)
Constant	-0.240***
	(0.075)
N	[illegible]



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