ABSTRACT

This paper reviews the literature on the South African state old age pension and its effects on household welfare and labour allocation. This literature is based mainly on the 1993 Project for Statistics on Living Standards and Development survey, with some papers using the KwaZulu Natal Income Dynamics survey or 2001/2002 Labour Force Survey. A major gap in the literature is the effect of the pension on pensioners themselves. This paper examines the questions of whether the pension benefits its recipients directly. To do this, it uses the 2002 Non-Contributory Pensions and Poverty Study, a data set that contains unprecedented detail on older adults but whose design is nationally non-representative. In this data set, pension receipt is weakly and non-robustly correlated with higher levels of satisfaction in older adults, but strongly correlated with increased probabilities of being the head of the household and controlling household expenditure. These results are explained in the context of a competitive household bargaining model in which the pension brings its recipients increased agency and power in the household, by increasing their resources for bargaining.

# 1.	Introduction

South African has a long tradition of state old age pension grants. The first, racially exclusive pension was introduced in 1928, to uplift poor white South Africans. By the 1950s, the pension had been extended to all racial groups, although the grant amounts varied by race. This situation continued until the 1992/1993 fiscal year, when pension equality across all racial groups was finally achieved (Moller and Ferreira, 2003).

South African has been unusually successful among less developed countries in its implementation of a cash grant system, with a highly sophisticated and mobile delivery system to rural and poverty-stricken areas, and a means-tested poverty threshold. As of April 2008, for a single individual to qualify, they must not earn more than R26 928 per year, or own more than R451 200 in assets. A couple must earn below R53 856 per year and own assets valued at less than R902 400. The old age grant is R940 per month. In 2002, the value of the grant was R620 per month (http://www.sassa.gov.za/). The purpose of the grant is to provide income support to individuals passed retirement age who lack substantial assets of their own; thus, the primary policy aim of the grant is to prevent extreme poverty among the elderly.

In light of this, it is surprising that so little academic study has been undertaken on whether the state old age grant does improve the lives of pensioners, a question whose answer is not as obvious as it may initially appear. The take-up rate for the old age pension among black South Africans was over 80% in 1993, according to Duflo (2000). *A priori*, making an income grant widely available to poor people is unlikely to cause them harm. However, a brief examination of the literature reveals that old age pensions are widely regarded as a social welfare tool to improve the lives of the pensioners' dependents – their grandchildren and children. The pension appears to have significant welfare effects on both these groups (Duflo, 2000 and Bertrand, Mullainathan and Miller, 2003). Further, there is some evidence that older adults are at times abused so that their families can obtain access to their pensions **(**Du Toit and Neves, 2006**)**. There is also some evidence that providing older adults with state grants discourages family remittances to a disproportionate extent – pensioners lose more money from withdrawn remittances than they gain from the pension (Maitra and Ray, 2002).

Thus, it is by no means obvious that pensioners themselves benefit from the state old age pension. This paper provides a thorough review of the literature and its conclusions thus far, illustrating the gap in prior research. It then addresses this gap by examining the question of whether receiving the old age pension increases older adults' satisfaction with their lives. This qualitative measure was

chosen, rather than a health, nutrition or expenditure measure, because it is clear, from the literature, that in many cases the financial beneficiaries of the pension may not be the pensioner, and that it cannot be assumed *a priori* that all such cases are instances of coercion. Further, this paper presents an explicit model of intra-household bargaining to explain the pension-sharing phenomenon, in which pensioners 'buy' status within the household. Both questions are addressed using data from the Non-Contributory Pensions and Poverty Survey.

Section two and three survey the relevant literature and present a theoretical model of household bargaining, respectively. Section four reviews the data and the methodology, and section five presents the results of the analysis. Section six concludes.

2.   Literature Review

Research on the effects of the pension has primarily focussed on members of the pensioner's household, in three areas: welfare effects; expenditure patterns; and labour market dynamics. By implication, the research raises interesting questions about intra-household dynamics, and sheds more light on the debate surrounding unitary models of household behaviour.

As the purpose of the pension is to improve the well-being of poor elderly South Africans, its welfare effects have attracted attention. Surprisingly, the individuals identified with these welfare effects are child members of the household, rather than the pensioners themselves. Duflo (2000) shows that the pension results in substantial income transfers to poor households, with significant improvements in the nutrition (and thus future prospects) of children in these households. This result holds only when the pension recipient is female – in these cases, a marked improvement in the weight-height ratios of girl children is seen. A trend in much of the research is the differing gender effects of the pension: as discussed below, female pensioners appear to give more of their income to other household members than do male pensioners. In a later paper, Duflo (2003) presents some possible reasons for this difference, including inherent gender differences, household decisions regarding transitory and permanent income flows and individual human capital investment decisions (Duflo, 2003).

The apparent split between the genders is also visible in the expenditure studies. Case and Deaton (1998) argue that pension income is treated similarly to any other income source. Household spending patterns do not differ significantly between pension income and income from other sources. However, they observe that female-headed households have different spending patterns to male-headed households, perhaps due to differing socioeconomic status or priorities. Households containing pensioners spend differently to other households, but they conclude that this is probably attributable to the differing needs of such households – the elderly require less transport and education, for instance, and thus if a household contains more elderly, it will tend to spend less on these sorts of goods. In contrast, Maitra and Ray (2002) argue that pensions are not spent in the same way as private transfers or income. Further, they argue that government-provided pensions crowd out private transfers from household members or relatives living elsewhere. They suggest that this means that poor households receiving a state old age pension may actually end up worse off than they would otherwise have been, if the state pension does not fully compensate for the lost value of the private transfers. This implies that pensions may not be as effective a redistributive tool as is claimed, as poor households typically receive state pensions and wealthier households receive

private pensions. They also find evidence to support the gender effects: male-headed households spend more on education and food, among other things, than do female-headed households – contrary to Duflo's findings on the same data set. Morris (2007) also finds that households with female heads spend more on education than do male-headed households, but this effect is smaller than those associated with pensioner household heads – less expenditure on education and healthcare and more on financial investment activities.

The area that has received by far the most attention is the labour supply effects of the pension.

There is widespread concern over the potential labour supply effects of cash grants in general – that a well-intentioned welfare intervention may have the unintended negative consequence of creating a disincentive to work for non-pensioner household members. However, there is a lack of consensus in the literature on whether this effect exists.

Bertrand, Mullainathan and Miller (2003) find that having a pension-eligible adult results in an increased tendency for other working-age household members to remove themselves from the labour force, or to reduce the number of hours they work. This effect is more marked when the pension recipient is female, and the working-age member is male. This paper strongly maintains that this is due primarily, or even solely, to the receipt of the state-sponsored pension, as no such effect is visible with elderly household members who are not eligible for the pension, and so cannot be attributed to the composition or health needs of the household.

In contrast, Eyal and Keswell (2008) find that the decrease in labour supply is observable in response to the presence of adults below the pension age, but old enough to require more care from other household members. Eyal and Keswell duplicate Bertrand *et al*'s model, but in a different data set (2001/2002 Labour Force Survey, as opposed to 1993 Project for Statistics on Living Standards and Development), which may account for the variation in results.

Posel, Fairburn and Lund (2006) raise another issue particularly pertinent in South Africa: migrant labour. Using the same 1993 data set, they show that the existence of a female pensioner within a household results in more working age adults identifying themselves as members of the household, although they are non-resident. Furthermore, working age men will tend to join the household and become residents, while working age females will "out-migrate" to become migrant labour. Whereas Betrand *et al* found negative effects for both female and male labour force participation, Posel *et al* find negative effects on labour force participation of working age males, but positive

effects for working age females. This effect is potentially attributable to the ability of a female pensioner to act as a replacement child-rearer, which would allow more working age women to migrate.

This theory is supported by a paper by Ardington, Case and Hosegood (2008), which uses a longitudinal survey from KwaZulu Natal to examine the effect of the presence, acquisition or loss of a pension-receiving household member. It finds that when a male household member becomes pension-eligible, only the migration of working men increases, but when a female household member becomes pension-eligible, the out-migration of working age men and women increases. This suggests that the childcare constraint is more binding on working age women, and that male pensioners do not cause this constraint to become non-binding.

The opposing labour force participation dynamics found by these authors could potentially be explained by the differing household definitions used: Ardington *et al* include non-resident household members, while Bertrand *et al* do not. The least employable members of the household are the ones most likely to remain resident, and thus will create an endogenous selection bias against labour force participation.

This is pointed out by Sienaert (2007), who analyses the various potential channels through which the pension can change individuals' incentives. Sienaert finds that the net effects on employment and labour force participation are negative, but that access to pension income increases out-migration, and when this migrant labour is taken into account the employment and labour force participation changes are far smaller, though still negative. He finds the same gender differential in terms of pension recipient that other studies find.

The gender differential is not visible when examining the labour supply effects of the pension on the elderly themselves. Lam, Leibbrandt and Ranchhod (2005), and Ranchhod (2006), both find that the pension has close to a pure income effect for most recipients, with no substitution of pension income for wage income. Indeed, many elderly pension recipients report continued work, although not necessarily for wages. For both men and women, at the age of pension eligibility there is a substantial decrease in labour force participation, although this is in fact preceded by significant withdrawals prior to this age: 25% of men and 10% of women. Further, some continue to work after receiving the pension. This suggests that while pension eligibility has a large and significant effect on labour force participation of the elderly, it is not the only factor at work – Lam *et al* argue that factors such as the household composition, marital status, health and education of individuals will

also affect their labour force participation significantly.

The above review of the literature reveals several interesting facts. The state old age pension is a useful welfare tool to improve child health, though Maitra and Ray's (2002) concern over the possible perverse results must be taken into account. The evidence on expenditure patterns is mixed; whether the difference in expenditure is due to intra-household bargaining, or to a unitary decision based on the needs of the household, is, as ever, unclear on the evidence available. It seems clear that pension receipt does change the expenditure patterns of the household, but that pension receipt has differing impacts among households because of differing priorities among the recipients.

The literature also reveals a rather glaring absence. Very little work has been done on the effects of the pension on pensioners themselves. Lam, Leibbrandt and Ranchhod (2005) are the only authors identified in this literature review as having studied this area. Even in this case, the impact of the pension was considered in terms of labour outcomes rather than welfare. The primary objective of the pension is to provide cash income to improve living standards among the elderly. With all the impacts that the pension has on other household members, what does it do for pensioners?

According to Lam, Leibbrandt and Ranchhod's paper (2005), receipt of the pension does allow the elderly to work less, though they caution that other factors also seem to be at play. This suggests that pensioners do capture some of the benefit from the pension. However, the pension appears to have large and significant effects on other household members: children's nutrition improves and working age adults either work less or use the pension income to fund migration to the city. Thus, pension income is inarguably spent in part on household members other than the pensioner. Further, pensions may replace, inadequately, private transfers previously received. In light of the breadth of people benefiting from what is, in the end, a grant designed for one person, how much of the benefit do pensioners receive?

3.   Theoretical framework

Household model

Appropriate ways to model the household form a long-running debate in economics. The traditional view of the household was to treat it as an economic agent like any other – the household acts to maximize its welfare function. All household members pool their resources to pursue this goal. At least three different justifications of such a unitary welfare function have been offered: household members act in the interests of the household due to altruism; household members' individual preferences are aggregated to form a set of common preferences; or one household member acts as a dictator, making decisions for the entire household. The alternative view sees the household as a collective of individuals, with household preferences determined cooperatively or competitively. The cooperative models suggest that household decisions arise from individual members' efficiency maximising actions, or from bargains underlying the formation and continued existence of the household. The competitive models argue that household decisions do not, per se, exist – individuals act as autonomous agents, maximising their own interests, as a result of which perceived household actions occur (Haddad, Hoddinott and Alderman, 1997).

The problem with these models for empirical economists is that they offer little way to choose between them empirically. It is extremely difficult to obtain data on how decisions within the household are made. Failing access to the day-to-day dynamics of households in general, it is possible to produce some logical reasoning in favour of one or other model. Unitary household models are very convenient, as they remove the necessity of trying to get inside the black box of the household and thus potentially make possible analysis that would otherwise be too complicated to undertake. However, it is simply not plausible that humans, acting as individuals in every other sphere of their life, completely surrender their autonomy when it comes to household decisions. It makes more sense to consider households as an imperfect coalescence of individuals, rather than a cohesive unit. The altruism and common preferences models both have the problem of how the aggregation of interests occurs – households are not beehives. Both models require, at a minimum, that the members of the household discuss their preferences, which immediately shifts the model into one of bargaining.

The conclusions of the literature review seem to favour non-unitary household models, and specifically competitive models. The results presented in Posel *et al* (2006), Maitra and Ray (2002), Case and Deaton (1998) and Duflo (2003) all suggest that income given to different members is spent in different ways – if the household had a collective utility function, or was composed of

individuals all trying to maximise efficiency, this would not happen. The cooperative models beg the question of how their underlying bargains were formed – if all members agreed to maximise household welfare, again, income should be spent in the same way, and additional expenditure would not vary by recipient. Thus, this paper will apply the idea of competitive bargaining to the household: each household member will use their own resources to maximise their own utility function. This does not exclude the possibility of altruism; it is quite possible, and indeed probable, that altruism will be one of the driving forces behind decisions of an individual within a household.

Pension power

According to the income pooling hypothesis, it is possible that many pensioners are contributing much or all of their pension to the general household income. Why should they choose to do this? The first possibility is that they do not choose to do so. There is anecdotal evidence of coercion of pensioners by their households, and this cannot be dismissed as a possibility (Du Toit and Neves, 2006). The second possibility is that pensioners freely choose to contribute their personal income to the household, in return for some payoff. This might be satisfaction, if they are fulfilling altruistic desires to aid their relations (Dixit and Skeath, 2004). This sense of satisfaction could also arise simply due to receipt of the pension and the agency and disposable income it entails. Pensioners might also surrender their pensions as their side of a bargain in which pensioners 'buy' something from other household members. This bargain may well not be explicit, but expressed in terms of social interactions and obligations. The most obvious manifestation of this implicit bargaining is the contribution of money in return for status. A household member who contributes income to the household is likely, other things equal, to have a higher status in the household than a member who does not contribute income. The long-running tradition of regarding non-paying 'home' work as low status, and wage-paying external work as high status, supports this. Alternatively, giving an individual more monetary income presumably gives them more bargaining power – this money can be traded for material goods or care, for the benefit of the income-recipient or their allies. Thus, it would be expected that an individual receiving the pension, all other things equal, is more likely to have higher status within their household.

Specific research questions

It is apparent from the literature review that the pension has welfare effects on pensioner households, although the specific beneficiaries, and even the direction of these effects, are open to dispute. The labour supply effects are also in dispute, caught between different theories and evidence. What has been missing from all this analysis is the central question of why pensioners choose to donate their income to the household.

Thus, the specific research questions that this paper sets out to answer are:

1) Do the elderly add their pension to the household income pool? If pensioners do not surrender their income to the household, there is little point investigating why they do so.

2) Do pensioners feel more satisfied with their lives if they receive a pension? Even if no household effects can be identified, the pension achieves its goal if pensioners feel more satisfied with life when they receive it.

3) Does the receipt of a pension increase the intra-household status of a given individual? This question revolves around the household bargaining model, and relies on the joint theses that more resources increase an individual's bargaining power, and that status is desirable for individuals. Thus, an individual with more resources will choose to 'purchase' more status.

4.   Data

The data used for this paper are obtained from the Non-Contributory Pensions and Poverty Study (NCPPS), which was carried out in 2002 in South Africa and Brazil.[1] The study aimed to obtain more information on the effects of non-contributory pensions, and to learn more about the concerns and lifestyles of the elderly, defined by the study to be individuals 55 years of age and older.

As such, the South African sample for the survey was selected with a bias towards households containing at least one 'older' individual. Rather than choosing a nationally representative sample within this constraint, three categories of household were selected: urban African; rural African; and urban Coloured. The rural African category was obtained from the Eastern Cape, and the other two were drawn from the Cape Town metropole area in the Western Cape. The data thus have no sampling weights, because the sample is not representative of South Africa (Moller and Ferreira, 2003). However, the conclusions drawn about particular categories may still be valid for that group in general.

The data are drawn from 1111 households, divided into 374 rural African households, comprising 1233 individuals, 324 urban African households, with 1126 individuals, and 413 urban Coloured households, with 1362 individuals. The survey is divided into two sections. The first is a fairly standard household questionnaire. These questions cover areas such as household profile and composition, the economic activities, income and expenditure of the household and its members, the health and care requirements of the household's members, and perceived quality of life. There is no question on the respondent's race – each household is classified only as urban or rural African or urban Coloured (category). This first section is supposed to be answered by the household member most knowledgeable about household expenditure. The second section focuses specifically on household members of 55 years or older, and was answered individually by each household member qualifying. It contains questions on the individual's access to grants – the government old age pension, the government disability pension, and the government veteran's pension – whether the individual receives money from other sources, how the individual spends his or her money, their perceived health, their activities and their quality of life. The second sub-section – on income sources and expenditure – was answered only by those respondents who reported receiving a state old age pension, which acts as a restriction on potentially interesting analysis.

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1   The NCPPS was funded by the British Department for International Development, and the South African section
     was carried out by the University of Cape Town, Rhodes University and the University of Manchester.

The first questions that arise are with regard to the distribution of the elderly in the sample, and their eligibility for and access to the pension. As shown in Table 1, 44.6% of pension-eligible adults live in rural African households, 21.5% in urban African households and 34% in urban Coloured households. Of those reportedly eligible for the pension, 91% of rural Africans access the pension, while the figures for urban African and Coloured are respectively 91% and 98%. This shows a very high take-up rate for the government pension, with little variation across the categories, which is consistent with the literature. [2]

Given that the data are generated from a sample of households that is not representative of national characteristics, it is important to check whether they are at all similar to the data from a more representative sample. To do this, the General Household Survey (GHS) of 2006 was chosen. All the households in the sample were selected to contain at least one person at least 55 years of age. It is a little surprising, then, that the number of older adults is so low – 1392. Tabulating the number of older adults per household, in Table 2, gives the result that the vast majority – 72% - of older adults live in households without another older adult. However, this matches the figure from the GHS very closely – 71%.

Another point is the large number of female household heads. Of older household heads, 51% are female. This becomes clearer when this is compared to the number of older adults in households, in Table 3 – in households with only one older adult, 61% of the household heads are female, but in households with two older adults, only 16% of household heads are female. As shown in Tables 4 and 5, 65% of the older female household heads are widowed (62% for all female household heads), and another 12% have never married. This suggests that if there are two older adults in the household, the male will be the household head. If, however, the eldest member of the household is a woman, who may be the widow of the former household head, then the household head is very likely to be that older woman. This result is again backed up with similar figures in the GHS survey, which reports that in households with one elderly person, 63% of older household heads are female, and that 66% of older female household heads are widowed.

These results suggest that the data are fairly representative, within the constraints of the categories. Although any conclusions drawn from the analysis conducted below must be considered cautiously, it is possible that they may be more generalisable than the sampling design suggests.

Based on a two-tailed t-test for equality between means, incomes for households containing

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2   All results for this section are available in Appendix A: Summary Statistics, at the end of the text.

pensioners are significantly lower than those of households without pensioners, in terms of total household monthly income excluding remittances, gifts in kind and earnings from rent or savings (Table 6).[3] This holds whether or not pension incomes are included in total household income. In contrast, mean individual income is significantly higher for pension-recipients than for non-recipients, when pension-income is included in total income. When pension income is excluded, pension-recipients become far poorer than non-recipients (Table 7). All these differences are significant at 1% confidence levels.

Average personal income across the entire sample is R339 per month. For non-pensioners, it is R286 and for pensioners it is R636. When pension-income is excluded from the calculation of total income, mean incomes become respectively R278 and R38. Thus, it is clear that the majority of pensioners' income is derived from the pension. Further, it is clear that pension income is a considerable share of household income – mean household income is R1842 (R1611 for households containing pensioners, and R2240 for households without). In 2002, the state old age pension was a grant of R620 per month – over a third of mean household income, and almost 40% of mean household income for pensioner households. Thus, receiving an old age pension would make an individual a significant bread-winner within the household.

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3   The method of calculating total individual and household incomes is given in Appendix D. In brief, individual income is the sum of all individual earnings (excluding household earnings from interest, savings, rent, remittances or gifts), and household income is this variable summed across all individuals in the household.

<u>Methodology</u>

This paper is primarily interested in the income sources and profiles of household members, as well as their status within the household and their activities, and especially in older household members. The NCPPS has unprecedented quantity and depth of information on older adults, due to the specific questionnaire targeting them. This information means that far more detailed analysis on such individuals can be carried out with this data set than with a more general data set. Specific research questions regarding the status, satisfaction or general living conditions of older individuals can thus be addressed. Thus, despite its limited generalisability, the data set is extremely valuable for such specific research, as can be seen below.

Income-pooling among the elderly

The questionnaire has two questions related to income pooling. In the main section, question D3 asks, "When people in the household get their money each month, do they?", with ordinal answer options of "All pool their income", "Pool some of their income", "Each keeps their own income", and "Unsure". In the older adult section, question AA11 asks, "How much of your pension and your own money can you keep for yourself?", with answer options of "None", "A little", "Some", "Most" and "All". It must be remembered that question AA11 was one of the questions answered only by older adults receiving a state pension. Thus, there is no way to determine rates of income pooling among older adults in general; the only data available in this dataset are for all households and for state pensioners. Another point to consider is the phrasing of the question: the use of "can" as opposed to "do" might have led to misinterpretation among respondents; this confusion is likely to be limited, as the ambiguity is more apparent to first language speakers, and, as shown in Table 8, there was not a majority of such respondents: 11%, compared to 57% Xhosa speakers and 31% Afrikaans-speakers.[4]

Satisfaction among the elderly

The second question faced is whether having the pension increases the elderly's satisfaction with life. In the older adult section, the questionnaire poses the question, "Taking all things together, how satisfied are you with your life as a whole these days? Would you say you are very satisfied, satisfied, dissatisfied or very dissatisfied?" The possible answers are the four previously listed, plus an option for "Neither satisfied nor dissatisfied".

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4   All results for this section are available in Appendix B: Methodology

As the regressand in question, reported satisfaction, is not only categorical but ordinal, an ordinal logit model must be used. In this case, the regressand can take on several values, namely five. Thus, the regression calculates the probability that the regressand falls into a particular value range, rather than simply zero or one.

The satisfaction variable is regressed against a mixture of categorical and continuous variables, namely: age, age-squared, individual income excluding pension, gender, the individual's category, whether the individual is the household head, whether the individual controls household income, whether the individual receives a state old age pension, the individual's reported health, and whether the individual belongs to a financial, social or community work group.[5] It is extremely hard to capture all or even most of the empirical determinants of satisfaction; the strongest influences are likely to be qualitative, such as expectations or personality. However, age, age-squared, total income and health are all likely to have an impact, due to their effects on capability. Gender and category are theoretically required, due to South Africa's strong patterns of gender and racial inequality. Membership of social, financial or community groups is an attempt to control for personality differences, on the hypothesis that involvement in activities will have an effect on or be indicative of an individual's personality – happier people might be more involved with their communities, or being more active might make people happier. Control of household income, household headship and receipt of pension are included because these are the variables of interest in later analysis.

Intra-household status

The NCPPS questionnaire has no specific questions on the subject of intra-household negotiation or relative status of individuals. To get around this problem, two potential measures of intra-household status were obtained: household headship; and primary control of household income.

As explained above, all household members are given codes in relation to the household head. An indicator variable (HHH) was created to give a value of one when an individual had a code of "1 – self" for this question, and zero otherwise. Another indicator variable (control) was created to give a value of one when the individual under investigation is the same as the individual with most say over expenditure, and zero otherwise.

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5   See Appendix D for more details on the definitions and creation of these variables.

These two dummy variables were regressed, in separate regressions, against the same set of variables and the other dummy. The variables used were age, age squared, total income, gender, whether or not the individual receives a pension,[6] the individual's education, whether the individual is the oldest member of the household, how many pensioners there are in the household, how many prime-age adults, how many older adults, and how many children there are in the household.[7] This set of variables is taken from a number of empirical analyses of household welfare and dynamics in the context of the pension. Age is often hypothesised to have non-linear effects, and thus the age squared term is included (Lam, Leibbrandt and Ranchhod, 2005). Differing effects by gender, race and location are also assumed by Lam *et al* and Posel *et al* (2006); in this data set race and location are conflated into the category variable. The individual's income and education level are included in many empirical models, including Ardington *et al* (2008) and Sienaert (2007). The importance of household composition is stressed in many papers, including Bertrand *et al* (2003) and Case and Deaton (1998), and thus variables for the number of pensioners, adults, older adults and children, and whether the individual is the eldest in the household are included.

Both control and HHH are two-category discrete variables, and thus can be analysed using normal logistic regressions. However, there is a potential problem with these variables. They are drawn from the main part of the questionnaire, which was answered by one household member. It is quite possible that there is bias in the answering of the relevant questions by this individual, through a desire to increase their perceived status, through misunderstanding the questions or genuine lack of knowledge about the household's dynamics.

To check the seriousness of this problem, a dummy variable for respondent was created, to be one if the individual was the respondent, and zero otherwise. Cross-tabulations of respondent and control, and respondent and HHH were performed, including the Pearson correlation coefficient.[8] Table 10 shows that there is a strong likelihood of a relationship between being the respondent and being reported as the household head, and Table 11 shows the same between being the respondent and being reported as the primary income controller. This is not necessarily sinister – given that the respondent is supposed to be the member most knowledgeable about household expenditure, there is a strong empirical probability that that respondent would naturally be the household head and the person most in control of the household's expenditure. However, this possible bias in the data must be borne in mind when drawing conclusions from the results. Specifically, when household headship and control of expenditure are the regressands, the effect of mismeasurement is to increase

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6   These variables are defined as they were in the satisfaction regression.
7   See Appendix D for more details on the definitions and creation of these variables.
8   See Appendix B: Methodology; Tables 10 to 12

the variance of the model. When they are regressors, mismeasurement is more serious, potentially resulting in bias and inconsistency in the parameters. There is no way to correct entirely for this problem, and thus all that can be done is to bear the effects in mind (Gujarati, 2003).

This analysis does illustrate the importance of including household headship in the control regression, and vice versa. There is a strong, non-negative relationship between headship and control of expenditure, shown in Table 12, as well as between each indicator and whether an individual was the respondent. Thus, it is necessary to include the variables in each others' regression. However, the relationship is not so perfectly predictable to necessitate a system estimation approach. While both variables are likely to be determined by similar factors, they are by no means identical. This is discussed in greater detail in the conclusion.

5.   Results

In this section, the results, significance and robustness of each analysis will be presented. The regression and test outputs are available in the appendices, as are the marginal effects of significant variables.[9] All regressions were run controlling for heteroscedasticity, and have robust standard errors. For the most part, the results were in line with the hypotheses, with some interesting exceptions: specifically, it appears that household headship and control of household income are not determined by the same set of factors, and appear to be associated with very different household effects.

Income pooling

Income pooling was very prevalent throughout the sample, and slightly more so among pensioners. In Table 13, it is seen that in 58% of households, respondents answered that all members of the household pooled their income, and 55% of the overall sample reported income-pooling. 65% of pensioners reported that they kept none of their pension income for themselves. Thus, a substantial majority of the sampled pensioners do indeed claim to donate their pension (and other income) to the household income pool. The hypothesised effect exists, and so the reasons for this apparent altruism can be investigated.

Satisfaction

The results are reported in the coefficient form. It is important to note that, as a result of the variable coding, higher values of the regressand indicate a higher probability of lower satisfaction level.[10]

The model contains some surprising results. As shown in Table 14, relatively few of the coefficients are significant, using a threshold of 10%. Pension receipt is significant at 5%, and influences the model in the expected direction – receiving a pension, all other things equal, is correlated with greater satisfaction. Household headship is significant at 5%, and correlated with decreased satisfaction, while better health (also significant in some categories) is associated with increased satisfaction. In combination, respondent category is significant. Age, age-squared, gender, total income, control of household income and group membership are not significant. The explanatory power of the model is low – only 18.7%. This is to be expected, as much of what determines an

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9   Appendix C: Results
10   Appendix C: Results; Tables 14 to 17

individual's satisfaction with live is likely to be endogenous to that individual's personality, and thus difficult to capture when analysing external factors. However, it is surprising that variables that might be thought to be influential in determining an individual's satisfaction with life, such as age and income, are insignificant, while less suggestive variables, such as category, are significant. Any attempt to model an individual's satisfaction using economic and demographic data alone is likely to be very crude, so these results must be viewed cautiously.

Thus, two alternatives of the model were examined. The first is a model excluding all insignificant variables, shown in Table 15. The second – given in Table 16 – includes cross-effects between pension receipt and each of the two status variables. The latter model has serious collinearity problems, and thus its conclusions are limited. However, the results of these alternative specifications indicate that the model is not robust. Specifically, in the latter model, pension receipt is insignificant, as is the cross-effect between pension receipt and household headship. Control and its cross-effects remain insignificant, while household headship is still significant and negative in its effect on satisfaction. The initial significance of pension receipt vanishes when cross-effects are included; this suggests that the pension receipt is not explicitly important in determining an individual's satisfaction, but may affect this outcome through its influence on household headship. This leads naturally into the next part of the analysis: how does the pension influence the intra-household status of recipients, measured by household headship and control of expenditure?

Status

Household headship

The log-odds of the results are analysed, and are available in full along with the marginal effects and coefficients in Appendix C, Table 18.[11]

As explained in the methodology, the household head dummy variable was regressed against a number of variables – listed in the methodology – and the control of household income variable. The cross-effect between pension-receipt and control of household expenditure was also included,

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11 According to Menard (2002), the log-odds ratio represents the natural log of the *odds* that an individual is the household head: the probability that he or she is the household head divided by the probability that he or she is not the household head. Thus, the log-odds is calculated as $\ln(\frac{P_i}{1-P_i})$, where $P_i = E(Y=1|X_i)$ and Y is the dummy variable for household headship. The log-odds ratio is interpreted in relation to one: a value greater than one represents an increased probability that the individual is the household head; and a value less than one represents a decreased probability that the individual is the household head. If the log-odds associated with a dummy variable X are 3.5, that means that an individual is 3.5 times more likely to be the household head, X being true, than if X is not true. If the log-odds are 0.5, it means that the individual is half as likely to be the household head.

as were cross-effects between control, pension receipt and eldest member. The threshold for significance used was 10%.[12]

Respondent category, very surprisingly, was not at all significant. Neither was the education level of the individual nor the number of children. In contrast, age, age squared, gender, total income, pension receipt and control were all highly significant. The number of pensioners in the household was significant, until the category for three pensioners – this may well be a result of very few observations in that category. The number of adults in the household was not significant.

The directions of the effects are also generally as were expected: a one year increase in age is associated with a 1.4 increase in the probability of being the household head. The decreasing coefficient on age squared must reflect that, past a certain age, an individual becomes less likely to be the household head, perhaps due to age-related problems. A woman is only 75 percent as likely to be the household head as is a man – this supports the understanding of South African society as still being strongly patriarchal. The person who controls the household income is almost 7 times as likely to be the household head, while someone who received a pension is 6 times as likely to be the household head, as an individual who scores zero for either of these categories. Someone who receives a pension and controls household income is almost 20 times as likely to be the household head as someone who scores zero for both. The eldest member of the household is 4 times as likely to be the household head as other individuals; this increases to over 8 times if that individual also controls household income.

If the household has more pensioners, the probability of any one pensioner being the household head decreases. The size of the pension effect is quite surprising. However, given that the value of the pension is well in excess of the mean monthly income among poor South African households, this may be explained by the relative size of the pension. Receiving the pension could well make an individual the primary income earner in the household, and thus give them great leverage in intra-household negotiations. The explanatory power of the model is 68%.

To check the validity and robustness of the model, it was compared to a revised model in which all insignificant variables were dropped, reported in Table 19. Only the significance of the number of pensioners in the household changes, becoming insignificant. The variables of particular interest – control of household income and pension receipt – retain their significance and magnitude, as do all other variables, suggesting that the underlying specification is fairly robust to changes. Testing

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reveals that there is a high probability that the insignificant variables can be safely excluded, without loss of power.

Thus, the conclusion seems to be that being male, being older, being the oldest, controlling household income and receiving a pension is associated with an increased probability of being the household head. Larger personal income has a small but positive effect on an individual's probability of being the household head, while that probability decreases with increasing numbers of pensioners, presumably as more candidates for headship are present, or due to more complex household structures. These results do not differ significantly across respondent category, leading to the conclusion that the pension does increase the probability that any given individual will be the household head, in any household. How does this compare to the other household status variable, control of household income?

Control

The log-odds of the results are again used, and are available in full along with the marginal effects and coefficients in Appendix C, Table 21. As explained in the methodology, the control of household income (henceforth, control) dummy variable was regressed against a number of variables – listed in the methodology – and the household head indicator variable. Variables for the cross-effects between household headship, pension receipt and eldest membership were included. Again, the threshold for significance was taken as 10%.[13]

At this threshold, total income and the number of children or older adults in the household are insignificant. Having two pensioners is significant, but the other numbers of pensioners are not. However, the number of adults in the household is significant. Being the eldest adult is insignificant, but being the eldest householder and the household head significantly increases one's chances of control. Certain levels of education were significant – having completed Grade Ten, Matric or Matric and a diploma.

The remaining variables – age, age-squared, gender, respondent category, household headship, pension receipt, the cross effect and number of prime-age adults – were significant. Age and age-squared have the same directional effects as they did for household headship. Gender is significant: a female is 5 times as likely as a male to control household expenditure. This is surprising, particularly given the results of the household head analysis. One possible explanation is that,

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although women are not likely to be the household head, they are likely to be the primary shoppers in the household. As the person who actually goes out and buys items for household consumption, they are thus likely to be reported as being the primary person in control of expenditure. Being the household head is associated with a 7 times increase in the likelihood of controlling household income; being a pension recipient with a doubled probability; but the cross-effect is insignificant. As the number of adults increases, the probability of an individual being in control of income decreases – this is intuitively sound, as an increase in the number of adults decreases the probability of any one adult being in control of household income. The explanatory power of this model is 43%.

This model was tested against a model respecified to exclude all insignificant variables, shown in Table 22. As in the household headship regression, the variables of particular interest are robust to changes, retaining their significance and magnitude of effects. Again, testing indicates that excluding the insignificant variables costs the model nothing.

The overall conclusion for the control regression is that being female, being older, being the household head and receiving a pension are correlated with controlling household expenditure, as is having complete junior or senior secondary school, or having obtained a diploma. As the number of prime-age adults increases, the probability of an individual controlling household expenditure decreases. The numbers of older adults and pensioners are not significant. The effect of the pension on control of income is far smaller than it was for being the household head.

6.   Conclusion

This paper produces some interesting conclusions. It is apparent that the majority of pensioners do contribute their income to the household income pool, and equally apparent that they do so to a far greater extent than do non-pensioners. Thus, the motivation for this behaviour is worth examining.

The results of the household headship question suggest that pensioners may be engaging in intra-household exchange. Receiving the pension has a large and significant positive correlation with an individual being the household head. An older adult who receives the pension seems to be more important in the household, which may well explain their willingness to spend their pension income on other members of the household. This result offers support to the hypothesis that pensioners use their pension to buy themselves status within the household.

In contrast, receiving the pension has only a small (but significant) effect on the probability of controlling household income. This is surprising, given the overlap in the data between the individual who is identified as the household head, and the individual who is identified as having the most say over how income is spent. This is rather a conundrum, and requires some analysis of what it means to be the household head.

The seeming contradiction between the results of the household headship regression and the control regression gives a certain amount of insight into this question. Being female, having fewer adults in the household and having higher levels of education increase the probability that an individual controls household expenditure. The total income received by an individual does not have an effect on the probability of controlling expenditure, but the racial group of the household does. In contrast, being female makes it less likely that an individual will be the household head, but having a higher total income increases the probability of headship. Neither education nor respondent category was significant in their effects. This seems to suggest that control of household expenditure and household headship are two very different phenomena, determined by different factors. This becomes easier to understand if the assumption that controlling income is a status issue is dropped. If the person who has the most say over how income is spent is the person who goes shopping, then the massive effect of being female is readily understandable, and fits in well with the negative coefficient on being female in the headship regression. If that is the case, then expenditure becomes an organisational issue – who in the household is best equipped to make spending decisions – rather than a status issue. However, headship appears still to be an issue of status. These results show that an individual with higher income is more likely to be the household head, which was the prediction

made by the household bargaining model adopted in this paper.

The answer to the first question posed by this paper is unclear: receiving the pension is robustly correlated with greater life satisfaction, but this conclusion must be tempered with an awareness of how endogenous to the individual satisfaction is. Another concern is that pension receipt makes an individual more likely to be the household head, but that being the household head is correlated with decreased satisfaction with life. If household headship is a management position, bringing with it administrative duties and increased responsibilities, this is understandable. However, if, as speculated above, household headship is primarily an issue of status, the reasons for this association are less clear.

If status is indeed a desired outcome, then the pension makes older adults better off, by increasing their resources for intra-household negotiation and thus their status. At the same time, the pension does not seem to be correlated with large increases in control over household income. This might be attributable to the fact that control over income is not a status variable, but is determined by factors which the pension does not affect, such as gender, education and household composition (although the pension, arguably, affects household composition). Even it is not, the small effect of pension receipt is not worrying, taken in context: any individual's income does not seem to affect their chances of controlling the household income, so this is not a problem particular to pensioners.

This paper applied a competitive bargaining model to the household, and thus the results produced in the paper cannot claim to offer evidence for the intra-household bargaining debate. However, it is interesting to note that the results of the data analysis are those predicted by the model, and thus this paper does not offer evidence against non-unitary household models. This is as expected – the value of the unitary household model lies in its simplifying assumptions, not in its adherence to reality.

By increasing the resources available to older adults, the state old age pension does improve the lives of pensioners. Leaving aside all concerns over the welfare of their grandchildren, or the labour market status of their children, the pension does appear to have its intended effect.

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Appendix A: Summary Statistics

Table 1

Sample statistics for pension eligibility and receipt

	Pension-eligible adults	Pension-receiving adults	Take-up rate (%)	Pension-eligible households	Pension-receiving households
Rural African	385	379	98.44	324	320
percentage	44.1	46.05		43.78	45.71
Urban African	192	176	91.67	274	160
percentage	21.99	21.39		37.03	22.86
Urban Coloured	296	268	90.54	242	220
percentage	33.91	32.56		32.7	31.43
Total	873	823	94.27	740	700
Men	279	258	92.47	-	-
percentage	31.96	31.35			
Women	594	565	95.12	-	-
percentage	68.04	68.65			
Total	873	823	94.27	-	-

Table 2

Distribution of older adults among households

	Number of households				
Number of older adults	1	2	3	4	Total
NCPPS	3960	1467	79	5	5511
percentage	71.86	26.62	1.43	0.09	
GHS	30467	11777	793	85	43128
percentage	70.64	27.31	1.84	0.20	

Table 3

Gender distribution of headship among heads 55+

Household	One 55+		Two 55+		Overall sample	
Head's Gender	Male	Female	Male	Female	Male	Female
NCPPS	306	504	233	44	491	523
percentage	37.78	62.22	84.12	15.88	48.42	51.58
GHS	2588	4456	2117	364	4410	4607
percentage	36.74	63.26	85.33	14.67	48.91	51.09

Table 4

Marital status of female household heads, all ages

	Married	Widowed	Divorced/Separated	Unmarried	Missing	
NCPPS	76	345	52	74	7	554
percentage	13.72	62.27	9.39	13.36	1.26	
GHS	2158	4232	900	4348	1	12072
percentage	17.88	35.06	7.46	36.02	0.01	

Table 5

Marital status of female household heads, 55+

	Married	Widowed	Divorced/Separated	Unmarried	Missing	
NCPPS	65	339	50	63	6	523
percentage	12.43	64.82	9.56	12.05	1.15	
GHS	490	3055	277	728	1	4607
percentage	10.64	66.31	6.01	15.80	0.02	

Table 6

T-test for equality of pensioner and non-pensioner household incomes,

including and excluding pension income

		Mean	Std Error	Std Dev	[95% CI]	
Pensioner (incl.)	(1)	1611.55	25.39	1504.04	[1561.81	1661.29]
(excl. pension)		873.49	25.53	1513.71	[823.43	923.55]
Non-pensioner (incl.)	(0)	2240.49	53.74	2425.93	[2135.1	2345.87]
(excl. pension)		2209.62	53.96	2436.04	[2103.8	2315.45]
Overall (incl)		1842.38	25.75	1919.09	[1791.89	1892.86]
(excl. pension)		1363.13	26.98	2010.55	[1310.97	1416.76]

Including pension income	**Excluding pension income**
t=10.5838	t=22.38
Satterthwaite's DOF = 2960.88	Satterthwaite's DOF = 2965
Ho: mean(0) - mean(1)=0	Ho: mean(0) - mean(1)=0
Ha: mean(0) - mean(1)!=0	Ha: mean(0) - mean(1)!=0
Pr(|T|>|t|)=0.0000	Pr(|T|>|t|)=0.0000

Table 7

T-test for equality of pensioner and non-pensioner individual incomes,

including and excluding pension income

	Mean	Std Error	Std dev	[95% CI]	
Pensioner income	636.11	6.9	197.59	[622.58	649.65]
(excl. pension)	38.57	7.03	201.29	[24.78	52.36]
Non-pensioner income	286.01	11.16	753.26	[264.13	307.89]
(excl. pension)	278.65	11.14	751.73	[257.12	300.79]
Over all	339.48	9.67	708.91	[320.51	358.53]
(excl. pension)	242.25	9.57	701.74	[223.48	261.01]

Including pension income	**Excluding pension income**
t=-26.67	t=18.25
Satterthwaite's DOF = 4805.36	Satterthwaite's DOF = 4735.81
Ho: mean(0) - mean(1)=0	Ho: mean(0) - mean(1)=0
Ha: mean(0) - mean(1)!=0	Ha: mean(0) - mean(1)!=0
Pr(|T|>|t|)=0.0000	Pr(|T|>|t|)=0.0000

Appendix B: Methodology

Table 8

Language mainly spoken in household

	English	Xhosa	Afrikaans	Southern Sotho	Zulu	Total
Households	123	634	349	4	1	1111
%	11.07	57.07	31.41	0.36	0.09	100

Table 9

Cross-tabulation of two pension-receipt questions

		Question d1.1					
		Yes	%	No	%	Missing data	%
Question	Yes	778	20.65	29	0.77	2	0.05
aa2.1	No	48	1.27	2865	76.06	45	1.19

Table 10

Cross-tabulation of Household head and Respondent

	Respondent				
HHH	No	%	Yes	%	Total
No	2519	67.71505	118	3.172043	2637
Yes	114	3.064516	969	26.04839	1083
					3720
	Pearson chi2(1)=2.7e+03			**Pr=0.00**	

Table 11

Cross-tabulation of Control of household income and Respondent

	Respondent				
Control	No	%	Yes	%	Total
No	2382	64.03226	297	7.983871	2679
Yes	251	6.747312	790	21.23656	1041
					3720
	Pearson chi2(1)=1.5e+03			**Pr=0.00**	

Table 12

Cross-tabulation of Control of household income and Household head

			HHH		
Control	No	%	Yes	%	Total
No	2376	63.07406	344	9.131935	2720
Yes	302	8.01699	745	19.77701	1047
					3767
Pearson chi2(1)=1.3e+03				**Pr=0.00**	

Appendix C: Results

Table 13

Income-pooling among households and individuals, by pensioner and non-pensioner

	Households				Individuals			
	Pensioner	%	Non-pensioner	%	Pensioners	%	Non-pensioners	%
Pool all income	422	61.43	641	57.90	519	65.12	2087	55.40
Pool part of income	174	25.33	291	26.29	209	26.22	1108	29.41
Keep all income	61	8.88	104	9.39	69	8.66	358	9.50
Total	687		1107		797		3767	

Results of Satisfaction regressions

Table 14
Full ordered logit regression (A)

Ordered logistic regression	Number of observations	1308
	LR chi2(16)	658.13
	Prob > chi2	0
Log pseudolikelihood = -1426.4034	Pseudo R2	0.1875
	AIC	2892.807

Dependent variable: taking all things together, how satisfied are you with your life as a whole?

Variable	Coefficient (90% Confidence Interval)
Age	-0.010 (-0.078 - 0.057)
Age squared	-0.000 (-0.001 - 0.000)
Personal income excluding pension	-0.000 (-0.000 - 0.000)
Gender (omitted category is male)	0.150 (-0.042 - 0.342)
Urban African	-2.207*** (-2.530 - -1.884)
Urban Coloured	0.192 (-0.105 - 0.489)
Household head (yes)	0.299** (0.081 - 0.518)
Controls household income (yes)	0.112 (-0.080 - 0.305)
Receives a pension (yes)	-0.355** (-0.602 - -0.109)
Health –good #	0.662 (-0.048 - 1.372)
Health – average	0.827* (0.130 - 1.523)
Health – poor	1.557*** (0.825 - 2.290)
Health – very poor	2.728*** (1.898 - 3.559)
Belongs to a financial group (yes)	-0.020 (-0.213 - 0.173)
Belongs to a working group (yes)	-0.414 (-0.875 - 0.048)
Belongs to a social group (yes)	0.324 (-0.140 - 0.788)
# Omitted health category is 'very good'	

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 15
Ordered logit regression omitting insignificant variables (B)

Ordered logistic regression

	Number of obs	1313
	Wald chi2(8)	454.17
	Prob > chi2	0
Log pseudolikelihood = -1443.9141	Pseudo R2	0.1814
	AIC	2911.828

Dependent variable: taking all things together, how satisfied are you with your life as a whole?

Variable	Coefficient (90% Confidence Interval)
Urban African	-2.222*** (-2.540 - -1.905)
Urban Coloured	0.117 (-0.174 - 0.408)
Household head (yes)	0.200* (0.008 - 0.393)
Receives a pension (yes)	-0.410*** (-0.608 - -0.211)
Health –good #	0.747* (0.053 - 1.441)
Health – average	0.905** (0.226 - 1.584)
Health – poor	1.642*** (0.929 - 2.356)
Health – very poor	2.827*** (2.009 - 3.644)
# Omitted health category is 'very good'	

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 17
Likelihood-ratio test (Assumption: A nested in C)

LR chi2(3)	1.99	Prob>chi2	0.5752
	Cannot reject assumption even at 10% significance levels		

Table 16
Full ordered logit regression with cross-effects (C)

Ordered logistic regression   Number of observations   1308
                                      Wald chi2(19)   487.12
                                      Prob > chi2   0
Log pseudolikelihood = -1425.4101   Pseudo R2   0.1880
                                      AIC   2896.82

Dependent variable: taking all things together, how satisfied are you with your life as a whole?

Variable	Coefficient (90% Confidence Interval)
Age	-0.015 (-0.083 - 0.054)
Age squared	-0.000 (-0.001 - 0.000)
Personal income excluding pension	-0.000 (-0.000 - 0.000)
Gender (omitted category is male)	0.168 (-0.024 - 0.360)
Urban African	-2.203*** (-2.526 - -1.880)
Urban Coloured	0.203 (-0.095 - 0.500)
Household head (yes)	0.463* (0.064 - 0.862)
Receives a pension (yes)	-0.120 (-0.527 - 0.288)
Controls household income (yes)	0.028 (-0.393 - 0.449)
Household head & controls household income	0.104 (-0.319 - 0.527)
Receives a pension and is household head	-0.349 (-0.769 - 0.071)
Receives a pension and controls household income	0.014 (-0.370 - 0.398)
Health –good #	0.680 (-0.040 - 1.401)
Health – average	0.840* (0.133 - 1.548)
Health – poor	1.572*** (0.829 - 2.315)
Health – very poor	2.749*** (1.911 - 3.587)
Belongs to a financial group (yes)	-0.012 (-0.206 - 0.182)
Belongs to a working group (yes)	-0.422 (-0.887 - 0.043)
Belongs to a social group (yes)	0.320 (-0.144 - 0.784)
# Omitted health category is 'very good'	

* significant at 10%; ** significant at 5%; *** significant at 1%

Results of Household headship regressions

Table 18
Full logistic regression (A)

Logistic regression		Number of observations	3730
		Wald chi2(43)	978.87
		Prob > chi2	0.0000
Log pseudolikelihood = -713.10626		Pseudo R2	0.6834
		AIC	1514.213

Dependent variable: are you the household head?

Variable	Log odds (90% Confidence Interval)	Coefficient (90% Confidence Interval)	Marginal effects (at the mean)
Age	1.348*** (1.271 - 1.430)	0.299*** (0.240 - 0.358)	0.016*** (0.014 - 0.019)
Age squared	0.998*** (0.998 - 0.999)	-0.002*** (-0.002 - -0.001)	-0.000*** (-0.000 - -0.000)
Personal income excluding pension	1.001*** (1.000 - 1.001)	0.001*** (0.000 - 0.001)	0.000*** (0.000 - 0.000)
Gender (omitted category: male)	0.075*** (0.054 - 0.104)	-2.593*** (-2.926 - -2.261)	-0.190*** (-0.227 - -0.153)
Urban African	1.042 (0.749 - 1.448)	0.041 (-0.288 - 0.370)	0.002 (-0.016 - 0.020)
Urban Coloured	0.813 (0.590 - 1.122)	-0.207 (-0.528 - 0.115)	-0.011 (-0.028 - 0.006)
Controls household income	6.695*** (4.347 - 10.310)	1.901*** (1.470 - 2.333)	0.159*** (0.098 - 0.221)
Receives a pension	5.860*** (2.768 - 12.406)	1.768*** (1.018 - 2.518)	0.156** (0.055 - 0.258)
No. of pensioners – 1	0.675* (0.462 - 0.986)	-0.393* (-0.773 - -0.014)	-0.021* (-0.042 - -0.000)
No. of pensioners – 2	0.359*** (0.192 - 0.674)	-1.023*** (-1.652 - -0.395)	-0.040*** (-0.060 - -0.021)
No. of pensioners – 3	0.387 (0.053 - 2.804)	-0.95 (-2.932 - 1.031)	-0.035 (-0.081 - 0.011)
No. of pensioners – 4	0.465 (0.014 - 15.549)	-0.767 (-4.277 - 2.744)	-0.03 (-0.126 - 0.065)
Controls household income and receives a pension	0.456** (0.265 - 0.785)	-0.784** (-1.326 - -0.243)	-0.034*** (-0.053 - -0.014)
Eldest member of the household	3.952*** (2.406 - 6.490)	1.374*** (0.878 - 1.870)	0.099*** (0.043 - 0.155)
Eldest Household member and controls income	2.720*** (1.562 - 4.739)	1.001*** (0.446 - 1.556)	0.073** (0.018 - 0.127)
Eldest household member and receives a pension	0.768 (0.397 - 1.484)	-0.264 (-0.924 - 0.395)	-0.013 (-0.044 - 0.018)
Education level – 2	0.633 (0.326 - 1.229)	-0.458 (-1.122 - 0.206)	-0.021 (-0.046 - 0.004)
Education level – 3	0.751 (0.417 - 1.354)	-0.286 (-0.876 - 0.303)	-0.014 (-0.039 - 0.012)
Education level – 4	0.783 (0.478 - 1.282)	-0.245 (-0.738 - 0.248)	-0.012 (-0.035 - 0.010)

Education level – 5	0.8 (0.529 - 1.209)	-0.224 (-0.637 - 0.190)	-0.012 (-0.032 - 0.009)
Education level – 6	0.815 (0.531 - 1.252)	-0.205 (-0.634 - 0.225)	-0.011 (-0.032 - 0.011)
Education level – 7	1.069 (0.666 - 1.716)	0.067 (-0.407 - 0.540)	0.004 (-0.023 - 0.030)
Education level – 8	0.732 (0.411 - 1.304)	-0.312 (-0.888 - 0.265)	-0.015 (-0.041 - 0.011)
Education level – 9	0.863 (0.122 - 6.095)	-0.148 (-2.103 - 1.807)	-0.008 (-0.101 - 0.086)
Education level – 10	4.704*** (1.837 - 12.043)	1.548*** (0.608 - 2.488)	0.162* (0.010 - 0.315)
Education level – 11	0.219 (0.032 - 1.492)	-1.517 (-3.435 - 0.400)	-0.045*** (-0.072 - -0.018)
Education level – 12	0.308 (0.084 - 1.127)	-1.179 (-2.478 - 0.120)	-0.039** (-0.066 - -0.013)
Education level – 13	0.143*** (0.048 - 0.422)	-1.948*** (-3.033 - -0.863)	-0.049*** (-0.066 - -0.033)
Education level – 14	1.882 (0.105 - 33.598)	0.632 (-2.250 - 3.514)	0.046 (-0.221 - 0.313)
No. of older adults – 1	1.763 (0.614 - 5.067)	0.567 (-0.488 - 1.623)	0.028 (-0.021 - 0.078)
No. of older adults – 2	0.524 (0.172 - 1.592)	-0.646 (-1.758 - 0.465)	-0.031 (-0.079 - 0.016)
No. of older adults – 3	0.376 (0.082 - 1.728)	-0.979 (-2.504 - 0.547)	-0.036* (-0.071 - -0.001)
No. of older adults – 4	0.864 (0.026 - 29.250)	-0.146 (-3.669 - 3.376)	-0.007 (-0.176 - 0.161)
Number of adults – 1	0.765 (0.510 - 1.147)	-0.268 (-0.673 - 0.138)	-0.014 (-0.033 - 0.006)
Number of adults – 2	0.699 (0.461 - 1.059)	-0.358 (-0.774 - 0.058)	-0.018 (-0.038 - 0.002)
Number of adults – 3	0.681 (0.432 - 1.074)	-0.384 (-0.839 - 0.071)	-0.019 (-0.040 - 0.002)
Number of adults – 4	0.598* (0.372 - 0.960)	-0.515* (-0.989 - -0.041)	-0.024* (-0.044 - -0.004)
Number of adults – 5	0.644 (0.367 - 1.129)	-0.44 (-1.001 - 0.122)	-0.02 (-0.044 - 0.003)
Number of adults – 6	0.793 (0.380 - 1.656)	-0.232 (-0.969 - 0.505)	-0.011 (-0.045 - 0.022)
Number of adults – 7	0.611 (0.256 - 1.461)	-0.493 (-1.365 - 0.379)	-0.022 (-0.053 - 0.010)
Number of adults – 8	0.458 (0.168 - 1.252)	-0.78 (-1.785 - 0.225)	-0.031* (-0.060 - -0.002)
Number of children – 1	1.193 (0.891 - 1.596)	0.176 (-0.115 - 0.468)	0.01 (-0.007 - 0.027)
Number of children – 2	0.939 (0.401 - 2.197)	-0.063 (-0.913 - 0.787)	-0.003 (-0.047 - 0.041)
Constant	0.000*** (0.000 - 0.000)	-10.684*** (-12.569 - -8.799)	3730

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 19
Logistic regression omitting insignificant variables (B)

Logistic regression

Log pseudolikelihood = -745.79442

Number of observations	3733
Wald chi2(13)	965.03
Prob > chi2	0.0000
Pseudo R2	0.6691
AIC	1519.589

Dependent variable: are you the household head?

Variable	Log odds (90% Confidence Interval)	Coefficient (90% Confidence Interval)	Marginal effects (at the mean)
Age	1.299*** (1.233 - 1.369)	0.262*** (0.209 - 0.314)	0.017*** (0.015 - 0.020)
Age squared	0.998*** (0.998 - 0.999)	-0.002*** (-0.002 - -0.001)	-0.000*** (-0.000 - -0.000)
Personal income excluding pension	1.000*** (1.000 - 1.001)	0.000*** (0.000 - 0.001)	0.000*** (0.000 - 0.000)
Gender (omitted category: male)	0.089*** (0.065 - 0.122)	-2.417*** (-2.732 - -2.101)	-0.204*** (-0.239 - -0.168)
Controls household income	6.856*** (4.515 - 10.410)	1.925*** (1.507 - 2.343)	0.191*** (0.126 - 0.256)
Receives a pension	6.223*** (3.515 - 11.018)	1.828*** (1.257 - 2.400)	0.193*** (0.106 - 0.280)
No. of pensioners – 1	0.724 (0.519 - 1.009)	-0.323 (-0.656 - 0.009)	-0.021 (-0.043 - 0.001)
No.of pensioners – 2	0.207*** (0.117 - 0.365)	-1.576*** (-2.143 - -1.008)	-0.065*** (-0.083 - -0.048)
No. of pensioners – 3	0.211 (0.040 - 1.100)	-1.557 (-3.209 - 0.095)	-0.055*** (-0.083 - -0.028)
No. of pensioners – 4	0.399 (0.140 - 1.134)	-0.92 (-1.966 - 0.126)	-0.041** (-0.072 - -0.011)
Controls household income and receives a pension	0.459** (0.270 - 0.780)	-0.779** (-1.310 - -0.248)	-0.041*** (-0.063 - -0.018)
Eldest household member	4.818*** (3.198 - 7.258)	1.572*** (1.163 - 1.982)	0.141*** (0.084 - 0.198)
Eldest household member and controls income	2.851*** (1.676 - 4.852)	1.048*** (0.516 - 1.579)	0.092** (0.030 - 0.154)
Constant	0.000*** (0.000 - 0.000)	-9.677*** (-11.010 - -8.343)	3733

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 20
Likelihood-ratio test (Assumption: B nested in A)

LR chi2(30)	65.38	Prob>chi2	0.0002

Cannot reject the assumption that model B is nested in model A – that the coefficients on the omitted variables are all equal to zero.

Results of Control of household income/expenditure regressions

Table 21
Full logistic regression (A)

Logistic regression	Number of observations	3733
	Wald chi2(44)	943.70
	Prob > chi2	0.0000
Log pseudolikelihood = -1253.3711	Pseudo R2	0.4339
	AIC	2596.742

Dependent variable: do you control household expenditure?

Variable	Log odds (90% Confidence Interval)	Coefficients (90% Confidence Interval)	Marginal effects (at the mean)
Age	1.238*** (1.197 - 1.281)	0.214*** (0.180 - 0.247)	0.025*** (0.022 - 0.029)
Age squared	0.998*** (0.998 - 0.999)	-0.002*** (-0.002 - -0.001)	-0.000*** (-0.000 - -0.000)
Total income excluding pension	1 (1.000 - 1.000)	0 (-0.000 - 0.000)	0 (-0.000 - 0.000)
Gender (omitted category: male)	4.994*** (4.048 - 6.162)	1.608*** (1.398 - 1.818)	0.182*** (0.157 - 0.207)
Urban African	1.058 (0.832 - 1.345)	0.056 (-0.184 - 0.296)	0.007 (-0.022 - 0.035)
Urban Coloured	0.653*** (0.516 - 0.826)	-0.426*** (-0.662 - -0.191)	-0.048*** (-0.074 - -0.022)
Household Head	6.986*** (4.829 - 10.107)	1.944*** (1.575 - 2.313)	0.303*** (0.231 - 0.375)
Receives a pension	2.300*** (1.414 - 3.741)	0.833*** (0.346 - 1.319)	0.116** (0.036 - 0.197)
Number of pensioners – 1	0.881 (0.695 - 1.116)	-0.127 (-0.364 - 0.110)	-0.015 (-0.043 - 0.013)
Number of pensioners – 2	0.631* (0.420 - 0.949)	-0.460* (-0.868 - -0.053)	-0.048** (-0.085 - -0.011)
Number of pensioners – 3	0.414 (0.124 - 1.384)	-0.883 (-2.090 - 0.325)	-0.075* (-0.146 - -0.005)
Number of pensioners – 4	0.462 (0.023 - 9.300)	-0.773 (-3.776 - 2.230)	-0.069 (-0.260 - 0.123)
Household head and receives a pension	0.635 (0.370 - 1.091)	-0.453 (-0.994 - 0.087)	-0.048 (-0.099 - 0.003)
Eldest household member	0.863 (0.547 - 1.360)	-0.147 (-0.602 - 0.308)	-0.017 (-0.068 - 0.034)
Eldest household member and is household head	1.710* (1.022 - 2.862)	0.537* (0.022 - 1.052)	0.07 (-0.004 - 0.143)
Eldest household member and receives a pension	0.704 (0.383 - 1.294)	-0.351 (-0.959 - 0.258)	-0.038 (-0.099 - 0.023)
Education level – 2	0.81 (0.448 - 1.464)	-0.211 (-0.803 - 0.381)	-0.023 (-0.083 - 0.037)
Education level – 3	1.061 (0.697 - 1.615)	0.06 (-0.360 - 0.480)	0.007 (-0.044 - 0.059)
Education level – 4	1.09 (0.762 - 1.560)	0.087 (-0.271 - 0.445)	0.01 (-0.034 - 0.055)
Education level – 5	1.207 (0.890 - 1.637)	0.188 (-0.116 - 0.493)	0.023 (-0.016 - 0.062)

Education level – 6	1.324 (0.959 - 1.829)	0.281 (-0.042 - 0.604)	0.035 (-0.008 - 0.078)
Education level – 7	1.478* (1.019 - 2.143)	0.391* (0.019 - 0.762)	0.051 (-0.002 - 0.104)
Education level – 8	1.915** (1.237 - 2.966)	0.650** (0.212 - 1.087)	0.091** (0.020 - 0.162)
Education level – 9	0.841 (0.247 - 2.860)	-0.173 (-1.398 - 1.051)	-0.019 (-0.146 - 0.108)
Education level – 10	2.094* (1.108 - 3.956)	0.739* (0.103 - 1.375)	0.111 (-0.005 - 0.228)
Education level – 11	1.089 (0.439 - 2.699)	0.085 (-0.823 - 0.993)	0.01 (-0.103 - 0.124)
Education level – 12	15.628*** (4.711 - 51.838)	2.749*** (1.550 - 3.948)	0.575*** (0.329 - 0.821)
Education level – 13	1.043 (0.278 - 3.920)	0.042 (-1.281 - 1.366)	0.005 (-0.156 - 0.166)
Education level – 14	2.373 (0.854 - 6.589)	0.864 (-0.158 - 1.885)	0.136 (-0.065 - 0.337)
Education level – 17	20.366*** (4.433 - 93.561)	3.014*** (1.489 - 4.539)	0.626*** (0.351 - 0.902)
No. of older adults – 1	0.697 (0.316 - 1.536)	-0.361 (-1.151 - 0.429)	-0.045 (-0.147 - 0.058)
No. of older adults – 2	0.478 (0.212 - 1.077)	-0.738 (-1.551 - 0.074)	-0.078* (-0.155 - -0.001)
No. of older adults – 3	0.389 (0.143 - 1.057)	-0.944 (-1.944 - 0.056)	-0.080** (-0.136 - -0.023)
No. of older adults – 4	0.3 (0.018 - 5.087)	-1.204 (-4.035 - 1.627)	-0.092 (-0.215 - 0.032)
Number of adults – 1	0.610*** (0.452 - 0.824)	-0.494*** (-0.794 - -0.193)	-0.052*** (-0.081 - -0.023)
Number of adults – 2	0.460*** (0.339 - 0.623)	-0.777*** (-1.080 - -0.473)	-0.079*** (-0.108 - -0.051)
Number of adults – 3	0.398*** (0.288 - 0.549)	-0.922*** (-1.245 - -0.599)	-0.090*** (-0.119 - -0.062)
Number of adults – 4	0.317*** (0.215 - 0.467)	-1.149*** (-1.538 - -0.761)	-0.100*** (-0.125 - -0.074)
Number of adults – 5	0.313*** (0.206 - 0.475)	-1.161*** (-1.578 - -0.744)	-0.097*** (-0.123 - -0.071)
Number of adults – 6	0.296*** (0.147 - 0.597)	-1.217*** (-1.917 - -0.517)	-0.095*** (-0.129 - -0.061)
Number of adults – 7	0.200*** (0.088 - 0.455)	-1.611*** (-2.436 - -0.787)	-0.109*** (-0.138 - -0.079)
Number of adults – 8	0.301** (0.134 - 0.678)	-1.200** (-2.010 - -0.389)	-0.092*** (-0.130 - -0.054)
Number of children – 1	0.853 (0.684 - 1.062)	-0.16 (-0.379 - 0.060)	-0.018 (-0.043 - 0.006)
Number of children – 2	0.883 (0.440 - 1.774)	-0.124 (-0.821 - 0.573)	-0.014 (-0.089 - 0.061)
Constant	0.000*** (0.000 - 0.002)	-7.632*** (-8.885 - -6.380)	3733

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 22
Logistic regression omitting insignificant variables (B)

Logistic regression		Number of observations	3780
		Wald chi2(19)	953.68
		Prob > chi2	0.0000
Log pseudolikelihood = -1283.9442		Pseudo R2	0.4256
		AIC	2607.888

Dependent variable: do you control household expenditure?

Variable	Log odds (90% Confidence Interval)	Coefficients (90% Confidence Interval)	Marginal effects (at the mean)
Age	1.228*** (1.192 - 1.266)	0.206*** (0.175 - 0.236)	0.025*** (0.021 - 0.028)
Age squared	0.998*** (0.998 - 0.999)	-0.002*** (-0.002 - -0.001)	-0.000*** (-0.000 - -0.000)
Gender (omitted category: male)	5.669*** (4.604 - 6.980)	1.735*** (1.527 - 1.943)	0.199*** (0.174 - 0.223)
Urban African	1.171 (0.933 - 1.469)	0.158 (-0.069 - 0.385)	0.019 (-0.009 - 0.048)
Urban Coloured	0.756** (0.618 - 0.926)	-0.279** (-0.481 - -0.077)	-0.033** (-0.056 - -0.009)
Household Head	7.363*** (5.085 - 10.663)	1.997*** (1.626 - 2.367)	0.317*** (0.244 - 0.390)
Receives a pension	1.367 (0.906 - 2.060)	0.312 (-0.098 - 0.723)	0.04 (-0.016 - 0.096)
Household head and receives a pension	0.687 (0.400 - 1.179)	-0.375 (-0.916 - 0.165)	-0.041 (-0.094 - 0.013)
Eldest household member	0.937 (0.599 - 1.465)	-0.065 (-0.512 - 0.382)	-0.008 (-0.060 - 0.045)
Eldest household member and household head	1.889** (1.125 - 3.172)	0.636** (0.117 - 1.154)	0.085* (0.008 - 0.163)
Eldest household member and receives a pension	0.931 (0.522 - 1.660)	-0.071 (-0.650 - 0.507)	-0.008 (-0.075 - 0.059)
Number of adults – 1	0.634** (0.474 - 0.849)	-0.455** (-0.747 - -0.164)	-0.049*** (-0.078 - -0.020)
Number of adults – 2	0.488*** (0.364 - 0.655)	-0.718*** (-1.012 - -0.424)	-0.075*** (-0.103 - -0.047)
Number of adults – 3	0.426*** (0.311 - 0.582)	-0.854*** (-1.167 - -0.540)	-0.086*** (-0.114 - -0.058)
Number of adults – 4	0.383*** (0.262 - 0.561)	-0.959*** (-1.339 - -0.578)	-0.089*** (-0.116 - -0.061)
Number of adults – 5	0.333*** (0.223 - 0.497)	-1.099*** (-1.499 - -0.699)	-0.095*** (-0.121 - -0.069)
Number of adults – 6	0.313*** (0.161 - 0.608)	-1.161*** (-1.824 - -0.498)	-0.094*** (-0.128 - -0.060)
Number of adults – 7	0.239*** (0.106 - 0.537)	-1.432*** (-2.241 - -0.622)	-0.104*** (-0.137 - -0.071)
Number of adults – 8	0.194*** (0.078 - 0.486)	-1.637*** (-2.552 - -0.722)	-0.111*** (-0.142 - -0.080)

Constant	0.000***	-7.786***	
		(-8.620 - -6.952)	

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 23
Likelihood-ratio test (Assumption: B nested in A)

LR chi2(25)	61.15	Prob> chi2	0.0001

Cannot reject the assumption that model B is nested in model A – that the coefficients on all the omitted variables are individually equal to zero.

Appendix D: Variable Explanations

Total income variable

Question D1 in the main questionnaire section investigates the income of each household member. The source and value of all income, for each member, was inquired after and listed in the data. When no income was received from a source, it was originally coded as negative. These values were converted to zero. The variables (d1_2, d2_2, and so on) were then summed to give a value for total income. Total income excluding pensions was calculated as the sum of (d2_2, d3_2, etc). Household income was calculated as the sum of all household members' personal income – this omits earnings from savings or interest, rent, remittances or gifts in kind, as these values were recorded only for pension-recipients. Household members are identified by their "DRAID" (Development Research Africa Identification Number).

Variables in the satisfaction regression

Age and Age-squared

Age is taken directly from the questionnaire, from question B5. Missing values in the data are coded as negative; all negative age values are dropped, restricting the sample to observations with non-missing age values. Age squared is created by squaring these non-negative age values.

Gender

Gender is taken directly from the questionnaire, from question B4.

Income

Individual income is created as explained above.

Household headship

Household headship is a dummy variable which carries a value of one if the individual in question has a relationship of 'self' to the household head, in answer to B2, and zero otherwise.

Control of household income/expenditure

A later question, D4, asked the respondent which household member had the greatest say over how household income was spent. Another indicator variable was created (control), which takes on a value of one when the individual listed in D4 is the same as the individual under investigation, and zero otherwise.

Pension receipt

There are two questions on whether an individual receives a state old age pension: in D1, and in AA2.1. These questions do not produce the same individuals, though there is substantial overlap. It

was decided to use the answers to question AA2.1, as in almost all cases this question would have been answered by the pensioner themselves, and is thus less likely to contain errors than question D1, which was answered by the household respondent.

Health

Health is taken from the older adult section, where the adult is asked to assess their own health, across five potential categories, in question AA13.

Activity variables

The last three dummy variables were all generated from AA14.

"Financial group" is one if the individual reports belonging to burial society or stokvel, and zero otherwise.

"Social group" is one if the individual belongs to a senior centre, church group, sports group, women's club or community organisation.

"Working group" is one if the individual is a member of a church group, trade union, political party, school organisation, women's club or community organisation.

Variables in the status regressions

Individual income and whether or not the individual receives a pension were created in the same way as they were for the satisfaction regressions, as was age-squared. Age, gender and education levels were taken directly from the data.

Education

Education is not a continuous variable, as the categories do not correlate one-to-one with years of schooling, and higher values represent more unusual schooling, not necessarily higher quantities. As education was not the variable under investigation, it was not edited and was treated as a dummy variable. The categories have been left in their original form, and thus careful interpretation of the coefficients is necessary. The codes are as follows:

A value of 1 indicates that the individual is illiterate and without schooling; a value of 2 indicates literacy, but no formal schooling. Values 3-8 indicate increasing levels of formal schooling. 9-12 indicate formal schooling plus a diploma or post-school training. 13 and 14 represent some university and completed university, respectively. 15 and 16 indicate that the individual attended creche or pre-primary school, and 17 indicates that the individual was educated at a mental health institution.

1= No schooling - cannot read, write

2= No schooling - can read, write

3= Grade 1-2

4= Grade 3-4/ Std 1-2

5= Grade 5-7/ Std 3-5

6= Grade 8-9/ Std 6-7/ Form 1-2

7= Grade 10-11/ Std 8-9/ Form 3-4

8= Matric/ Grade 12/ Std 12/ Form 5

9= Grade 8 + diploma

10= Matric + diploma

11= Matric + teacher training

12= Matric + nursing

13= University courses

14= Completed University degree

15= Creche/daycare

16= Pre-primary

17= Mental health institution

Number of household members of each type

Numbers of pensioners, children, adults and older adults were all created using the same process. In each case, indicator variables for the relevant category were defined and then the number of non-zero responses was summed for each household, using the DRAID.

Number of pensioners

This indicator was defined here as it was for the satisfaction regression.

Number of children

A child was defined to be an individual less than 18 years of age.

Number of adults

An adult was defined to be an individual who was less than 55 years of age but at least 18.

Number of older adults

An older adult was defined to be an individual 5of 5 years or more.