

## LARGE CASH TRANSFERS TO THE ELDERLY IN SOUTH AFRICA\*

*Anne Case and Angus Deaton*

We examine the social pension in South Africa, where large cash sums—about twice the median per capita income of African households—are paid to people qualified by age but irrespective of previous contributions. We present the history of the scheme and use a 1993 nationally representative survey to investigate the redistributive consequences of the transfers, documenting who receive the pensions, their levels of living, and those of their families. We also look at behavioural effects, particularly the effects of the cash receipts on the allocation of income to food, schooling, transfers, and savings.

In South Africa, a large ‘social pension’—about twice the median per capita income of African households—is paid in cash to people qualified by age irrespective of previous contributions. We present the history of the scheme and explain how such large transfers could come about in an economy in which the recipients were not only politically weak, but without any political representation whatsoever. We then use a 1993 nationally representative survey to investigate the redistributive consequences of the transfers, documenting who receive the pensions, their levels of living, and those of their families. We also look at behavioural effects, particularly the effects of the cash receipts on the allocation of income to food, schooling, transfers, and savings.

The pressing policy issue for South Africans is whether it makes sense to target seven billion rand (nearly \$2 billion) of social expenditure through the current pension schemes. Our analysis contributes to the discussion by documenting the redistributive and behavioural effects of the transfers. We find that, at least as far as immediate incidence is concerned, and without allowance for behavioural effects, the social pension is an effective tool of redistribution, and that the households it reaches are predominantly poor. Because so many of the elderly among South Africa’s African population live with children, the social pension is also effective in putting money into households where children live. In most countries, social expenditures on the elderly and social expenditures on children are alternatives, but South African living arrangements mean that, at least to some extent, the pension is an instrument that simultaneously reaches both groups. The fraction of children living with a pensioner is highest among children whose household per capita incomes are

\* The initial work was funded under a cooperative agreement between the Institute for Policy Reform and Agency for International Development (AID), Cooperative Agreement No PDC-0095-A-00-1126-00. Subsequent work was financed by the John D. and Catherine T. MacArthur Foundation and by the National Institute of Aging. We should like to thank two referees as well as Harold Alderman, Libby Ardington, Tim Besley, Carlo del Ninno, Peter Diamond, Jonathan Gruber, Dudley Horner, Hilary Hoynes, Pieter LeRoux, Frances Lund, Christina Paxson, T. Paul Schultz, Francis Wilson and seminar participants at USAID, the World Bank, the London School of Economics, the Universities of Cape Town, Natal in Durban, and Princeton, and the NBER Public Economics Group for comments and discussions.

the lowest, so that the pension not only reaches the households in which children live, but disproportionately reaches children in poverty.

An understanding of the South African experience is relevant more broadly, for the design of transfer policy in other countries, and for a number of other issues in the literature in economics and economic development. Perhaps the most important general topic is the place of cash transfers in anti-poverty measures. Although the South African transfer we study is labelled a 'social pension', and is paid only to the elderly, its non-contributory nature, its large size, and its comprehensive coverage set it apart from other pension arrangements around the world, see for example World Bank (1994, Tables A1–7). Outside the industrialised countries, Eastern Europe, and the FSU, cash transfers rarely figure in anti-poverty strategies. While there are a number of inframarginal food-stamp programmes in developing (and industrialised) countries that are often claimed to be equivalent to cash in their behavioural (although not political) effects, the empirical evidence on the equivalence is unclear. Pure cash transfers may be rare because they are not viable; they may be difficult to administer; they may not reach their intended beneficiaries; or they may not be politically sustainable—arguments on which we elaborate below. If cash transfers are successful in South Africa, is it only because of its unique history and political situation, or are there lessons that should lead to a general positive reevaluation of cash transfers as a component of anti-poverty programs in developing countries?

The fact that cash transfers are unusual contrasts with the prescription that cash transfers are always part of a first-best transfer scheme. Cash can be targeted directly to the desired beneficiaries, it allows recipients freedom of choice in their spending and it avoids the losses that are associated with providing goods whose shadow value to the recipient is less than their cost to the provider. The distortionary effect of cash transfers on labour supply is surely insignificant in many developing countries (and especially South Africa) where there are high rates of under- and unemployment. Yet the literature gives a number of arguments for why non-cash transfers might be useful. Even when lump-sum taxes and transfers are possible, donors (or taxpayers) are often thought to have preferences over the consumption pattern of the beneficiaries, see Garfinkel (1973). In second best optima, in-kind transfers can be useful to correct other distortions, Guesnerie and Roberts (1984), or to screen out undesirable recipients, Nichols and Zeckhauser (1982), as in food-for-work schemes. Even so, these arguments do not preclude the partial use of cash, nor do they necessarily outweigh the preference in its favour that comes from the first-best arguments. Even in famine situations, there are good arguments for using cash in preference to in-kind food aid. Drèze and Sen (1989) find that distributions of cash remedy the failure of 'entitlements' and allow the market to deliver food efficiently in response to the appropriate price signals, see also Coate (1989). Previous South African evidence is consistent with similar effects on poor households in a *non-famine* context. Indeed Ardington and Lund (1994, p.19) argue from their fieldwork that pensions are 'a significant source of income, with definite redistributive effects; they are a

reliable source of income, which leads to household security; they are the basis of credit facilities in local markets, further contributing to food security; they deliver cash into remote areas where no other institutions do; they are gender sensitive towards women; and they reach rural areas as few other services do.' Our analysis of the national survey data in this paper is consistent with this summary. Yet cash transfers are rare in developing countries around the world.

One explanation may lie in political and administrative feasibility. Producers of in-kind goods have an interest in stimulating their output, and are often politically powerful. Governments often wish to increase consumption of merit goods, and favour allocations to children (or others) who consume such goods. It may also be hard to administer cash transfers in poor countries. In largely illiterate populations with poor record-keeping it is difficult to collect income tax or to pay subsidies through the direct tax system. In the absence of good information, means testing based on income is impossible or unreliable, and it is hard to prevent fraud through money going to recipients who are not entitled to the benefit, or through the diversion of funds by corrupt administrators or politicians. Yet pensions in South Africa are administered by a maze of regional authorities, several of whose administrative capabilities are likely no better than those in many countries with lower per capita incomes, particularly in Asia. And although there have been some problems with (high-level) corruption and diversion of benefits, the South African authorities appear largely to succeed in handling the logistical and security problems associated with making regular monthly deliveries of large cash sums, even to illiterate elderly people in remote rural areas.

More generally, social pensions in South Africa also provide an example of what Akerlof (1978) calls 'tagging', sometimes referred to as 'indicator' targeting, where benefits are keyed to a characteristic—in this case age—that is correlated with the characteristic of interest, in this case poverty. (See also Haddad and Kanbur (1993).) By confining receipt to a specific and well-identified group, the tax costs of the scheme are limited and the same costs deliver larger benefits than would be possible under a universal scheme, such as a negative income tax. One of our aims in this paper is to investigate the nature of the correlation between age and poverty, including the poverty of those who live with elderly recipients. We also make a first attempt to look at the behavioural responses that could affect the ultimate incidence of the scheme, although we acknowledge that many of the most profound effects, such as changes in living arrangements or patterns of migration, will only become apparent over a longer time horizon.

Our analysis of South Africa also investigates whether different kinds of income have different effects on behaviour. There are several possible reasons. Pension income is more regular than farm income, for example, so that additional pension income may generate more expenditures than additional farm income. Here we focus on a two-way classification of income, by source—wages, property income, or transfers—and by the person responsible for receiving it—individual *A*'s earnings, or individual *B*'s entitlement to the social pension. Once again, these questions are of interest beyond the South African

context and, depending on the classification, refer to two separate literatures. One is on intra-household allocation and on 'unitary' versus 'collective' models of household decision making, see in particular Bourguignon and Chiappori (1992), and Browning *et al.* (1994). Unitary models treat the household as a single decision making unit, while the collective models allow for different interests within the household whereby it becomes possible for the ownership of income to affect the pattern of its use. Because the South African transfers are so large, and because they accrue to people who are not typically the main providers, we have a good laboratory in which to look for switches in expenditure, either towards goods directly favoured by the elderly, such as health care, or indirectly, such as expenditures on their grandchildren. Alternatively, if household heads make decisions about the allocation of expenditure, and since in 86% of pension households the pensioner is either the head or the head's spouse, it is possible that pension income is spent like other income.

There are rather different issues associated with sources of income. These have already arisen in the United States in the context of welfare payments through AFDC. In a recent survey, Haveman and Wolfe (1995) cite several studies that purport to show that while family income typically has a beneficial effect on various measures of child success—test scores, graduating from high school, avoiding teen pregnancy, and eventually earning high incomes—the effects of AFDC income are less, and in some cases even negative. Since money is money, and there is no obvious channel through which its labelling should affect behaviour, there must be a suspicion that such results are not what they seem. One possibility is that the AFDC income is correlated with some unobserved determinant of performance, neighbourhood effect, low school quality, or perhaps the mysterious 'negative force of an underclass heritage', Hill and O'Neill (1994). These effects of AFDC in the United States are mirrored for the social pension income in South Africa; for example, in African households pension income appears to have little or no effect on many expenditures of interest, including food and education. We find a good deal of support for measurement error as an explanation of such results, so that when our estimate of income is a poor one, the receipt of the transfer may indicate poverty more precisely than does a low value of measured income. Using the best corrective procedures we can muster, our results are consistent with the view that pension income is like other income, so that even if a dollar is not always a dollar, a rand is always a rand.

The paper is laid out as follows. Section 1 begins with a brief history of the social pension in South Africa and explains how the monthly payments are made. We then use the 1993 data to provide a description of the people who receive it and of the households in which they live. We document the progressivity of the scheme, and how living arrangements bring the pension to households with larger than average numbers of children. Section 2 turns to a behavioural analysis of the effects of pensions on the disposition of expenditures, focussing on food, health, and education. We also look at the relationship between pension receipt and direct measures of child health and

nutrition. With appropriate correction for measurement error, we typically find no special effects of the pension; pension income is spent like other income.

Our evaluation of the pension scheme is quite favourable, and we believe that the South African experience calls for a serious look at similar direct cash transfers more generally. Even so, there are two important issues that we do not address, and evidence on either could temper our conclusions. One is the effect of pensions on living arrangements, for example grandchildren moving to live with their grandparents. At the time of the survey in 1993, the pension scheme had been in full operation for less than a year, so that the available data are unlikely to be informative about this question. The second issue is the effect on private transfers, and in particular the extent to which remittances are reduced so that the pension benefits are shared between the direct recipients and those who were previously supporting them. This is the topic of a paper by Jensen (1997) who finds evidence for a significant reduction in remittances to the elderly in response to the pension, around 20 to 30 cents for each rand received.

## 1. Social Pensions in South Africa

### 1.1 *Pension Arrangements*

The social pension in South Africa is a largely unintended consequence of the country's recent history. Most white workers are covered by private occupational pension schemes, and a means-tested state pension was originally introduced as a safety-net to provide for the limited numbers of white workers who reached retirement without adequate provision. Occupational pensions have limited portability and, although workers receive a lump-sum on separation from an employer, in most cases the amount is simply the accumulated contribution of the employee. African workers in the past have had less attachment to the formal labour force, and even those with long-term employment relationships were generally excluded from their employers' pension programmes, Ambrogi (1994, p. 17).

The political forces behind social pension provision in South Africa differ from those in many developing countries. It is often the case that demand for social pensions is driven by poverty among the elderly as multi-generation living arrangements break down, when the young are either no longer willing or perhaps able to care for aging parents. In South Africa, the initial extension of the social pension to the Coloured and Indian population was in part an attempt to make the three-chamber parliament politically palatable, van der Berg (1994). The size of the state pension was gradually equalised across all racial groups during the disintegration of the apartheid regime. With the possible exception of the youngest pensioners, none of the current African recipients could have held any reasonable expectation during their working lives that such a pension would be available. The social pension for elderly

Africans thus provides an unusual opportunity to examine the consequences of giving people sums of money that are both large and unanticipated.

Given the current distribution of income and of private pensions between races in South Africa, the social pension scheme is largely a transfer from the country's wealthy White population to its much less wealthy African, Indian and Coloured populations. However, in a country with large fractions of the adult population unemployed and children living in poverty, the elderly are perhaps not the most obvious target for social transfers. Since South Africa is no exception to the rule that benefits create their own constituencies, there is no immediate prospect of large-scale change, but it remains to be seen whether current pension levels are maintained in the long-run or are allowed to erode. South Africa also has a child maintenance grant system from which Africans were historically excluded, and which, in a sharply curtailed form, was extended to the whole population beginning in January 1998. Documentation of the beneficiaries of the current pension system is an important input into current discussions on delivery of social assistance.

The maximum benefit in 1993 was 370 rand a month (about \$3 a day) and was paid to all women over the age of 60 and men over the age of 65. (By January 1998, the amount had been increased to 470 rand.) Payment is subject to a means test. For a single age-qualified individual, 'means' are defined as the sum of income and an income value assigned to assets, and the pension is reduced one for one when means exceed 90 rand a month (in 1994) until means reach 370 rand, beyond which point no pension is provided. This generates a discontinuous drop of 90 rand a month at pre-pension means of 370 rand. For age-qualified married couples, means are (to a first approximation) calculated by pooling and dividing by two. The means test does not take into account income of other family members, so that, for example, there is no incentive for family dissolution or migration. The effectiveness of the test varies across the several regional authorities that administer the scheme; some object to means testing on principle, and others are incapable of carrying it out, see Lund (1993). Nevertheless, the means testing is almost certainly effective to the extent that it excludes almost all Whites as well as some upper-income Africans, including probably most of those who receive private pensions. As we shall see, 80% of age-qualified Africans receive a social pension and, of those, the vast majority receive the maximum.

The benefits are large; 370 rand is around half of average household income, and it is more than *twice* the median per capita monthly household income of Africans, see Table 2 below. A comparison with the United States might be instructive. The US annual poverty line for a family of four in 1992 was \$14,228 or \$3,557 per head. A useful poverty line for poor countries is the \$1 per person a day suggested by World Bank (1990); this converts to 105 rand per person per month, and about 35% of Africans were in poverty by this criterion at the time of the survey. A grant of 370 rand a month is 3.52 times the poverty line, so that the rough equivalent in the United States would be a payment of \$1,000 a month.

The extension of the social pension to the whole population took several

years, and was operating fully in all areas—including remote rural areas—only by the beginning of 1993. It is no mean task to deliver large amounts of cash on a monthly basis to an elderly rural population, many of whom are illiterate. How this is done is of interest because fraud and lack of effective administration are often thought to prevent the adoption of such schemes elsewhere. Once age-qualified people are registered as eligible for the pension, they are given an identifying number and are fingerprinted. On the appointed day, the pension team drives through the countryside making stops at convenient locations, such as local stores or meeting points. The team consists of an administrator and ‘tellers’ who help the recipients operate automatic teller machines (ATMs) mounted on vans, together with armed guards, who keep non-pensioners and others—including the traders attracted by the event—away from the distribution site. The ATMs are similar to the machines found in the U.S. or Europe, but with one additional feature; they can check fingerprints. The vans are equipped with a local area net that is capable of checking identity by matching the finger in the ATM with records of the prints of those who are eligible, and doing so within the usual timespan of an ATM transaction. This technology—which has only recently been developed—permits fast and accurate identification of individuals, even in the absence of the forms of identification typical of industrialized countries.

The pension scheme has been in operation for too short a time to permit more than a provisional assessment of the risks of corruption and fraud. There is little evidence of widespread abuse by pensioners, but there have been problems with administrators creating fictitious pensioners. The fragmentation of control over multiple local authorities has introduced opportunities for abuse, and there are obvious risks in transporting large sums of cash around the countryside, particularly a countryside where rates of violent crime are high by world standards.

### 1.2 *Who Benefits from the Pension?*

The data for this paper come from the national household survey of South Africa carried out jointly by the World Bank and the South African Development Research Unit (SALDRU) at the University of Cape Town. During the last five months of 1993, in the period leading up to the elections in April 1994, the survey collected data from some 9,000 randomly selected households from all races and areas, including the so-called independent homelands. As is inevitable in collecting data from South Africa, the survey follows the apartheid-era classification of race into White, Coloured, Indian and African. We adopt the terminology throughout the paper, with capitalisation signifying this specialised usage. The survey follows the general methodology of the World Bank’s Living Standard Surveys in that it is an integrated survey, collecting information on a wide range of household characteristics and activities. Such surveys are well designed for the task at hand since interventions as large as the social pension are likely to have far-reaching effects on household welfare and behaviour.

Table 1 describes pension receipt by race and location, as recorded in the World Bank-SALDRU data. Each household was asked to report income from the social pension for each household member, and Table 1 presents the counts of people who reported positive receipts in the last month. The counts are grossed up by the sampling weights, so that the figures presented here are estimates of the total numbers of women and men by race who reported receiving a pension in the second half of 1993. The first row of the table shows the counts of women and men who are age-qualified for the pension, i.e., the total number of men aged 65 and older, and the total number of women aged 60 and older. The second row displays counts of pension recipients, and the third row presents estimates of the percentage of age-qualified people who report receiving a pension. We have made no attempt to allow for means testing, so that the estimates in row three are simply the percentages of people in an age group who report receiving a pension, not a measure of take up among those entitled.

The estimates should be treated with a certain amount of caution. Age reporting in the survey is far from perfect, and there is a good deal of age 'heaping,' respondents rounding their ages to the nearest multiple of five or

Table 1  
*Numbers of South Africans Qualifying for and Receiving the Old-age Pension, by Race (thousands)*

	All races		Coloureds		Indians		Whites	
	men	women	men	women	men	women	men	women
Qualified by age	719	1,689	41	109	11	30	151	269
Reporting receipt	437	1,156	24	72	7	19	11	37
percent	61	68	58	66	67	62	7	14
Underage by < 5 years	332	483	27	39	9	10	70	87
Reporting receipt	75	46	2	1	1	0	1	2
percent	23	10	7	2	10	0	1	2
Total monthly outlay (millions of rand)	191	443	9	26	3	6	4	13
Africans								
	All		Rural		Urban		Metropolitan	
	men	women	men	women	men	women	men	women
Qualified by age	516	1,281	385	948	69	181	61	152
Reporting receipt	395	1,028	296	762	58	150	41	116
percent	77	80	77	80	83	83	67	77
Underage by < 5 years	225	348	144	224	40	56	41	68
Reporting receipt	71	43	46	24	21	12	4	8
percent	31	12	32	11	53	21	10	12
Total monthly outlay millions of rand	175	398	133	301	27	57	15	41

Notes: Those qualified are men 65 or older and women 60 or older; those underage by < 5 years are men aged 60–64 and women aged 55–59. Those reporting receipt are the individuals (members of households) in the survey who reported receiving the old age pension in the last month. Source: Authors' calculations based on World Bank/SALDRU survey, August–December 1993.



ten. As a result, some of the women (men) who say that they are 60 (65) years old are undoubtedly younger and therefore not qualified for the pension. There is also a non-trivial number of respondents who claim to be in receipt of a state pension even though they report their age to be less than the qualifying age. Roughly a quarter of all men aged 60 to 65, who are thus within five years of age-qualification, report receiving a social pension, while a much smaller number (10%) of women within five years of qualification report pension receipt. This difference suggests that some local authorities may be equalising the age of pension eligibility between men and women.

According to the estimates in Table 1, 1.2 million elderly women and 0.4 million elderly men are in receipt of state pensions. The total is a close match to the figure of 1.6 million given by the Director General of the Department of National Health and Population Development, quoted in Ambrogi (1994). The take-up rates of 80% for African women, and 77% for African men, are consistent with the evidence from KwaZulu-Natal quoted in Ardington and Lund (1994). As is to be expected from the means testing, and from the occupational and income differences between racial classifications, the fractions of elderly receiving the pensions are much higher for Africans than for other groups, although even among Coloureds and Indians nearly two-thirds of the elderly report receiving the pension. Only 14% of White women and 7% of White men report receiving any pension payments.

The bottom panel of Table 1 disaggregates African pension receipt by urban, rural and metropolitan area. The take-up rates presented speak strongly to the programme's effectiveness in reaching rural households. The take-up rates among rural elderly Africans—roughly 80% for both men and women—are just shy of take-up rates in urban areas (83%). The lower take-up rates in metropolitan areas (67% for men) may reflect greater prevalence of occupational pensions among city-dwellers.

Table 2 presents characteristics of households containing at least one pension recipient together with the corresponding characteristics for the population as a whole. The first panel shows demographic characteristics for all households by racial group. Households with pension income are larger than average, which is not surprising since it takes the presence of a pensioner for the household to receive a pension. More interesting is the fact that households with pension income have more children than average, 2.28 as opposed to 1.69. This difference is entirely attributable to African households since, for the other three races, there are *fewer* children in pensioner households. The importance of three generation households among the African population was signalled in Ardington and Lund's previous work on KwaZulu-Natal. Only White households conform to the standard North American and European pattern whereby old people live largely by themselves or with other old people; there is only one child for every eight White pensioner households. Much the same point can be seen from the statistics on average age. The average age difference between pensioner and all households is only 6.3 years for Africans, but is 11.3 years for Coloureds, 13.8 years for Indians, and 24.9 years for Whites.

Table 2  
*Demographic Characteristics of Pension Households*

	All Races		Africans		Coloureds		Indians		Whites	
	All households	Pension households	All households	Pension households	All households	Pension households	All households	Pension households	All households	Pension households
<i>Demographics</i>										
Number of males	2.10	2.67	2.24	2.78	2.23	2.12	2.13	1.80	1.49	0.97
Number of females	2.34	3.35	2.54	3.43	2.44	3.26	2.25	2.76	1.52	1.58
Number of children	1.69	2.28	1.95	2.43	1.68	1.48	1.33	0.88	0.76	0.13
Age (average)	28.89	34.89	27.31	33.62	27.00	38.34	28.42	42.21	35.97	60.90
<i>Per Capita Income</i>										
Mean income per household member	710	284	322	201	537	388	1,005	787	2,385	2,254
Median income per household member	263	160	171	147	327	282	671	483	1,708	743
<i>Pensions</i>										
Fraction of households with pension	17.0	100	21.3	100	12.6	100	9.8	100	2.9	100
Income share of pension	10.3	59.2	13.3	61.6	5.4	42.2	2.2	23.4	1.1	36.5
<i>Household Income Sources</i>										
Total household monthly income (rand)	2,153	1,224	1,024	1,005	2,046	1,876	3,941	3,486	6,504	5,268
Household gross wages (formal sector)	1,538	468	721	386	1,648	870	2,814	2,111	4,613	1,346
Household wages (casual sector)	49	24	31	23	60	42	36	12	118	30
Remittances to household (cash and kind)	64	74	71	76	54	58	44	7	38	55
Average pension income	75	440	94	443	52	420	40	418	12	387
<i>Family Structure</i>										
Fraction households with pensioner head	14.3	84.6	18.4	86.5	9.1	72.0	5.8	59.9	1.9	64.8
3 generations (with a child)	22.5	58.3	27.8	60.2	22.3	60.7	13.1	39.9	2.8	8.97
Skip generation	3.0	12.6	3.9	13.6	2.0	6.9	0.4	3.9	0.1	0

Notes: Information on household income by source is reported only for households with non-missing total household monthly income figures (8,673 households). Sources of income not reported in this table include rents; travel, food and housing subsidies; agricultural income; and self employment income.

Given the marked differences in demographic structures between African and White pensioner households, and the much larger fraction of the former that receive state pensions, it is clearly possible that age-based transfers have favourable effects, not only for the elderly, but also for their children and grandchildren. Of the 11.9 million African children under the age of 16, 3.8 million (32%) live with a social pensioner. (This contrasts sharply with the living arrangements of White children; only one-half of one percent of South Africa's 1.2 million White children live with a social pensioner.) Of course, much depends on what happens to the money, whether it is simply used to supplement family income, or whether it is directed to specific purposes, an issue to which we shall return in Sections 2 and 3.

Perhaps the most notable feature of the income data in the second panel of Table 2 is the extraordinary difference between incomes of White and African households; median per capita household incomes *differ by a factor of ten*. Without this large difference, the pension transfers would surely be infeasible. The table also shows that the pensions successfully target poorer households and that, even including the pension income in monthly income, mean and median incomes per head are lower in households with pensions, in some cases substantially so. Given the possible influence of a few large income figures, medians are the preferred indicator of central tendency in incomes. The difference between median per capita income between pensioner and all households is smallest among Africans, but African incomes are so low, and pensions so large, that the median incomes of pensioner households are necessarily relatively high. The next two rows of the panel document the importance of pension income, especially among Africans. Over all African households, the average share of pensions in income is 13.3%, and is 61.6% among households with at least one pension recipient. Among African households, 21.3% receive some pension income, compared with 17.0% among all households.

The middle panel also provides a breakdown of monthly household incomes by source. Average total household income is virtually identical between all African households (1,024 rand per month) and those with a pensioner (1,005 rand). For both, the two most important income sources are formal sector earnings and the social pension. However, the weights placed on these sources of income vary markedly between all households and those with pensioners. On average, African households earn 721 rand per month in the formal sector, and little by way of pension income (94 rand per month), while pensioner households' income tends to be split between members' earnings in the formal sector (386 rand per month) and pension receipts (443 rand per month). Only 1% of pensioners report earning any wages in the formal sector, so that the attribution of income to household members is straightforward: pension income enters the household through an elderly member, and formal sector income through younger members. Because higher income households have lower pension shares, average pension income is a lower percentage of average household income (44.1% among African pensioner households) than is the average income share of the pension among pensioner households (61.6%).

The final panel in Table 2 presents information on family structure, the percentage of households with pensioner heads, the percentage of households in which three generations of one family are represented—typically grandparents, parents and children—and the percentage of households in which the middle generation, of prime age workers, is missing—so-called ‘skip-generation’ households. The first row shows that almost 85% of all pension households are headed by pension recipients or the spouses of pension recipients, and the figure is slightly higher among African households. We restrict our counts of three- and skip-generation households to those in which at least one member is under the age of 16, in order to flag households with children present. More than a quarter of all African households (28%) contain three generations. Again, the comparison between African and White households attests to the difference in living arrangements between the groups; fewer than 3% of White households have three generations present. Households receiving a pension are more likely to house three generations than are other households. While this is true for all racial groups, it is most notably so for Africans and Coloureds, where a full 60% of pensioner households hold three generations.

Due in part to the legacy of apartheid, it is common for African adults to migrate in order to find work, leaving their parents and their children to care for each other. The bottom row of Table 2 shows that roughly 14% of African pensioner households are skip-generation households. Taken together, three- and skip-generation households account for nearly three quarters of all African pensioner households.

The overwhelming representation of three- and skip-generation households among African pensioner households could be a response to the pension, at least in part. Children may relocate to live with an elderly parent who is receiving a large and reliable cash payment. However, there are several reasons why this is unlikely: African families were living in three generation households long before the pension became universal; the pension system only came fully on line shortly before the survey date, giving households little time to regroup; and nothing prohibits pensioners from providing transfers to children and grandchildren who do not live with them. Whatever the determinants of household structure, the numbers in Table 2 show that, in a vast majority of cases, transfers to elderly Africans are received by households with children.

The effect of pension transfers on the distribution of income is displayed graphically in Fig. 1, which shows the distribution of income including and excluding pension income for African households (left panel) and all households (right panel). The graphs are non-parametric (kernel) estimates of the density of the logarithm of per capita household income, constructed on an individual basis and taking into account the sampling weights so as to approximate the densities in the population. In each case, the density is estimated using both total income and income excluding pension income. Note that this is a mechanical exercise that takes no account of changes in behaviour such as a decrease in remittances to the elderly. If such responses are important, income levels in the absence of the pension would not equal

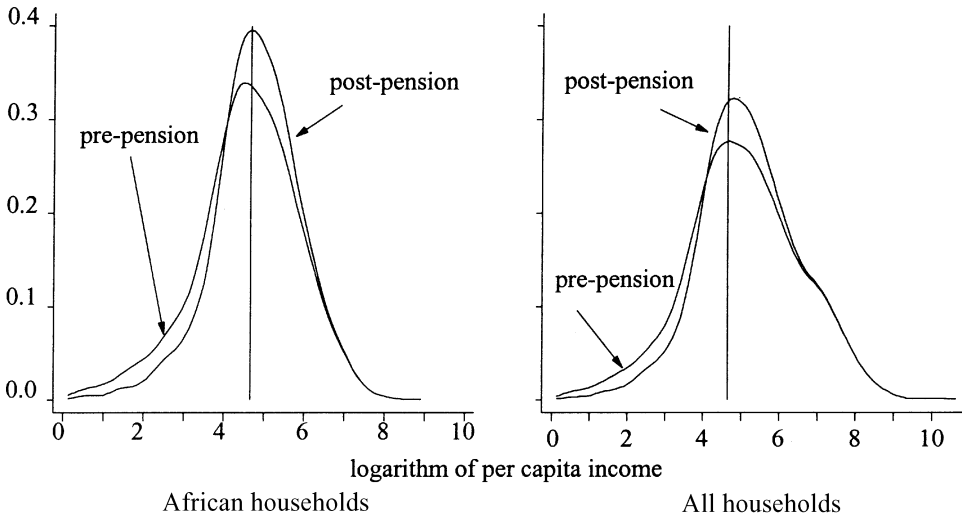


Fig. 1.

income minus the pension. In addition to the two density curves, we have plotted a vertical line at (the logarithm of) 105 rand per month per person, which approximates a poverty line of \$1 per person per day at the current exchange rate. This is less generous than most of the poverty lines in use or under discussion in South Africa, but the fact that the African distribution has its mode near this point establishes that African households are poor by any international standard.

The left-hand densities are more dispersed than the right-hand densities because the all-African income distribution is more equal than that for the whole population. Indeed, the presence of rich White households can be seen in the bulge at the right of the right-hand densities. The effect of pension income is to shift mass from the lower tail to the middle of the distribution, reducing poverty and inequality by squeezing up the distribution. Fig. 2 shows the empirical cumulative distribution functions of the logarithms of household per capita income including and excluding the pension. About 35% of Africans live on less than \$1 a day. This figure would be 40% if the pension incomes were removed and there was no offsetting change in pre-pension incomes. Because the two distributions do not cross, it is immediately clear that, in the absence of behavioural response, pensions reduce poverty and that the result is independent of the choice of poverty line.

It is not immediately clear why age-based targeting is so progressive in South Africa nor whether it would be so more generally. In neither developed nor developing countries is there any simple general relationship between age and poverty. The official poverty counts in the United States show that the fraction of the elderly in poverty is slightly less than the fraction of the non-elderly who are poor and much less than the fraction of children in poverty. In developing countries, an assessment of the economic status of the elderly is made difficult

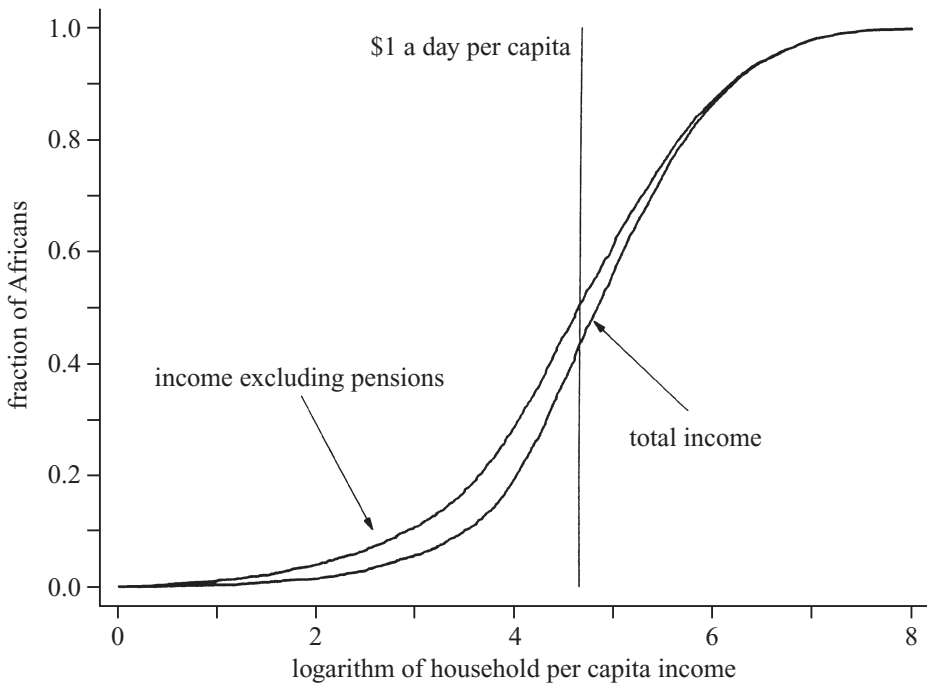


Fig. 2.

by the fact that nearly all the elderly live in households that also contain non-elderly people, see Deaton and Paxson (1997), but some observers have claimed that general poverty among the elderly is a myth, World Bank (1994). In the current context, the social pension could be progressive either because pensioner households have low incomes, or because means testing is effective, or both. In fact, means testing seems to be relatively unimportant, at least among Africans, a finding that is documented in Fig. 3.

The graphs show average pension receipts as a function of household income, exclusive of the pension, in the left-hand panel for African households, and in the right-hand panel for White households. The conditional expectations are calculated using Fan's (1992) locally weighted regression smoother, which allows the data to determine the shape of the function, rather than imposing (for example) a linear or quadratic form. The solid line shows actual average receipts, and the broken line what average receipts would be if each age-qualified person received a monthly pension of 370 rand. For Africans, potential and actual receipts are virtually identical, because the take-up is high and because most people receive 370 rand. The progressivity of the pension, the fact that the line slopes down from left to right, comes from the poverty of households in which the African elderly live, and not from denying or limiting pensions to those with higher incomes. The same is not true among White households where receipts and potential receipts coincide only at the

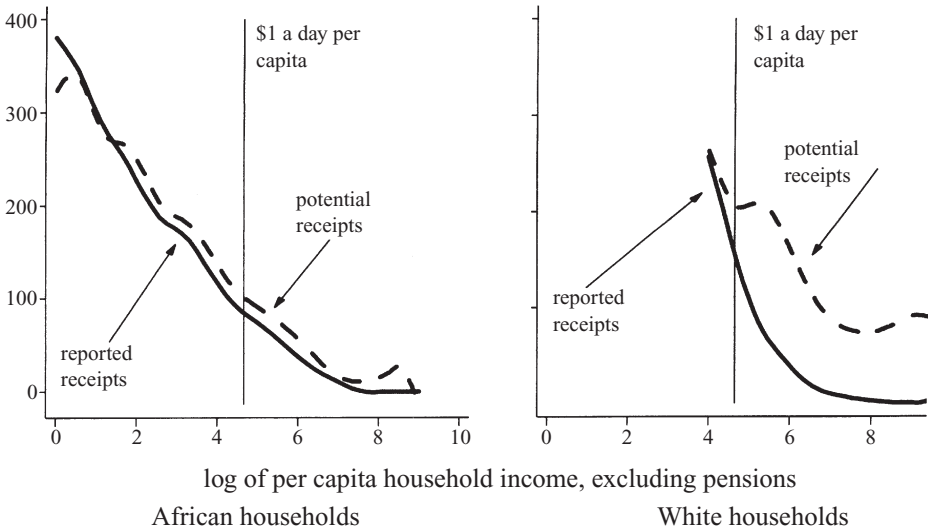


Fig. 3.

lowest White income levels, and where at higher incomes, few age-qualified people report receiving anything from the social pension.

Fig. 4 is a disaggregation by income of our finding that 32% of African children live in households where there is at least one pensioner. It shows the fraction is higher the poorer the household in which the children live, so that, if we are concerned with helping the poorest children, the pension is likely to be more effective than the 32% would suggest.

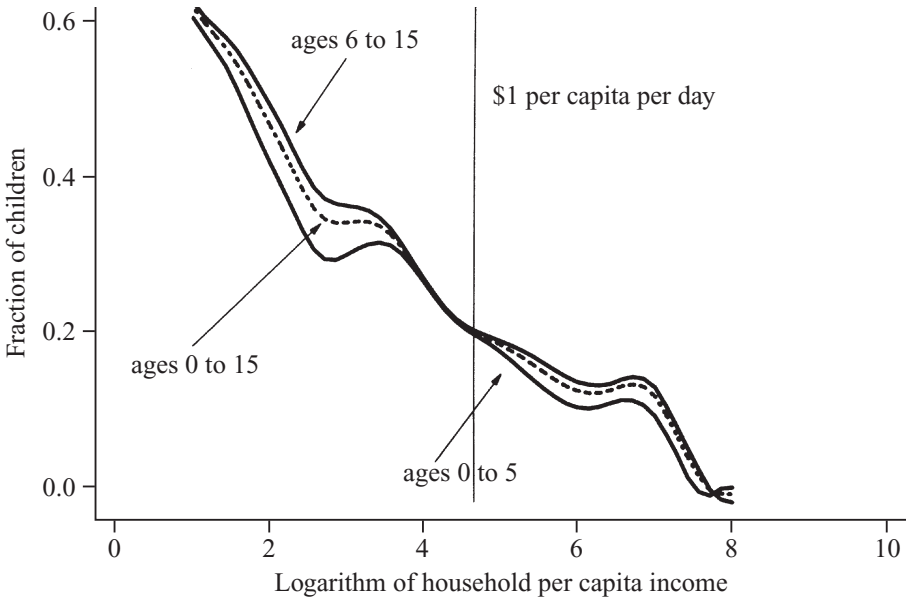


Fig. 4.

The determinants of pension receipt are further examined in Tables 3 and 4, where we look both at the probability of pension receipt among age-qualified individuals and at the amount of household pension income received. We need these results, not only to complete the current discussion, but also in anticipation of the behavioural analysis in Section 2. Table 3 presents OLS estimates of the effects on household pension receipts of household income (excluding pensions), demographic composition, and geographic location for all households (column one) and for African households separately (column two). Standard errors in this (and later) tables are calculated robustly so as to allow for both arbitrary heteroskedasticity and the cluster structure of the sample; the same applies to F- and  $\chi^2$ -tests. As is to be expected, the main determinants of pension receipts are the numbers of age-qualified men and women in the household, but conditional on these numbers, household income excluding pensions is negatively and significantly correlated with pension income received, and reported payments are higher in the erstwhile 'independent' homelands of Transkei, Bophuthatswana, Venda, and Ciskei. (Not reported in the table.) Holding all else constant, the replacement of a prime-age adult (aged 25 to pension age) with someone age-qualified for the pension is expected to increase pension income by 200 to 300 rand per month, an effect that dominates all others in the regression. Indeed, the close connection between pension income and the number of elderly will present an identification problem when we come to analyse the effects of pensions on behaviour.

Also in anticipation of the behavioural analysis, we present estimates of the determinants of pension receipt in which income excluding pensions is instrumented on a number of characteristics of the household head. The instrumentation is not designed to correct for the endogeneity of income but to correct for measurement error in the estimates of income. The instruments, which are listed in the notes to the table, relate primarily to the head's employment and education and are selected because we expect them to be relatively well measured, because they are plausibly uncorrelated with the measurement error in income, and because they have no obvious direct effect on either the probability of pension receipt or its size.

The estimates are presented for all households (column three) and separately for African households (column four). In both cases, the instrumentation of household income doubles the estimated negative effect of other household income on pension receipts; in the African case, the estimated impact of an extra rand of other income on pension income is reduced from  $-0.010$  to  $-0.027$ . The absolute values of the coefficients on most of the household demographic variables also increase markedly, as would be expected if household income were measured with error and true household income were correlated with household composition. In what follows, we will also find that instrumenting household income has a significant effect on estimates of pension income disposition. Pension income is relatively well-reported and is negatively correlated with true household income so that, when true household income is measured poorly, pension income acts as an



Table 3  
*Determinants of Pensions Receipts*

	All (OLS)	Africans (OLS)	All (IVE)	Africans (IVE)
Income excluding pension	-0.0085 (0.0010)	-0.0101 (0.0018)	-0.0143 (0.0017)	-0.0267 (0.0040)
Household size	13.62 (2.06)	8.35 (2.14)	15.05 (2.36)	12.39 (2.68)
Children 0-5	-17.92 (3.03)	-13.64 (3.27)	-19.59 (3.71)	-18.60 (4.26)
Children 6-15	-11.42 (2.58)	-7.00 (2.83)	-12.33 (2.99)	-10.72 (3.53)
Members 16-24	-10.48 (2.46)	-7.94 (2.74)	-10.54 (2.91)	-10.04 (3.36)
Females $\geq$ 60	251.86 (8.96)	295.17 (8.32)	246.83 (9.58)	291.70 (9.04)
Males $\geq$ 65	221.89 (16.6)	282.55 (16.1)	215.76 (16.6)	272.87 (16.5)
Number of observations	8,377	6,403	7,250	5,344

Notes: Dependent Variable: Total social pension received by household (Rand). Robust standard errors reported in parentheses for all regressions. 14 (pre-election) province indicators included in all regressions. Sample restricted to households with total monthly income excluding pensions that is non-negative and less than 10,000 rand. In the instrumental variable regressions, income excluding pensions is instrumented on indicators for whether the head is present, female, employed, holds a regular wage job, is a casual labourer, is self-employed in agriculture, is self-employed in another field, is a dual job-holder, indicator of head's pay-type (monthly, fortnightly, or weekly), and head's standard of completed education.

Table 4  
*Determinants of the Probability of a Receiving a Pension Conditional on Age Qualification*

	Probit	OLS regression	IV regression
Income excluding pension	-0.0002(0.00004)	-0.000 06(0.00001)	-0.000 17(0.00004)
Household size	0.0585(0.0306)	0.0168 (0.0082)	0.0452 (0.0135)
Number of children 0-5	-0.1178(0.0493)	-0.0325 (0.0138)	-0.0604 (0.0134)
Number of children 6-15	-0.0083(0.0435)	-0.0045 (0.0116)	-0.0363 (0.0167)
Number of members 16-24	-0.1297(0.0465)	-0.0366 (0.0130)	-0.0550 (0.0163)
Number of females $\geq$ 60	0.1368(0.1268)	0.0433 (0.0354)	0.0387 (0.0382)
Number of males $\geq$ 65	-0.0861(0.0837)	-0.0246 (0.0218)	-0.0511 (0.0235)
Number of Observations	1,914	1,914	1,751

Notes: Robust standard errors reported in parentheses. Regressions are restricted to African individuals from households with monthly income excluding the pension that is non-negative, and does not exceed 10,000 Rand. 14 (pre-election) province indicators were also included in all specifications. Sample is restricted to those qualified by age for the pension, i.e. men aged 65 and over and women aged 60 and over. The first column is a probit, the second a linear probability model, and the third a linear probability model in which income excluding the pension is instrumented using the instrumental variables listed in Table 3.

indicator that the household is poor even in the presence of measured income. Note that this does *not* imply that the administrators of the pensions means test do a better job of measuring income than the household survey; the result could hold even if the administrators made no effort to measure income and provided pensions to all who are age qualified. All that is needed is that the presence of age-qualified people in the household has predictive power for low income in the presence of imperfectly measured income.

Household income excluding pensions and household demographic variables affect pension income through their effect on the probability of pension receipt. This can be seen in Table 4, in which the determinants of pension take-up are examined for age-qualified Africans. The first column is a probit, the second a linear probability model, and the third a linear probability model in which income excluding pensions is instrumented using the instrumental variables listed in Table 3. The effect of other household income on the probability of pension receipt more than doubles when this income is instrumented, and the estimated impacts of household demographic variables rise in absolute value, again speaking to the role of measurement error in the uninstrumented regressions.

We can find no evidence against the supposition that means testing acts only on whether or not individuals receive the pension, and not on the amount received given that any pension is paid. In supplementary regressions, the amount of the pension received was regressed on province indicators and the predicted probability of receiving a pension and the fit was compared with unrestricted regressions on all the variables in Table 3. The F-statistics were 0.14 for the OLS regression and 1.00 for the instrumental variable regression, which is consistent with the view that income and household demographic

variables affect pension income only through their effect on the probability of pension receipt.

## 2. The Behavioural Effects of Pension Income

### 2.1 *Pension Income and Food Expenditures*

A good place to start an inquiry into the allocation of pension income within the household is with food expenditures. Most people who live in households that receive pension income are poor, and if pension income is simply added to household resources, we should expect it to show up in additional purchases of food. We follow a familiar and standard procedure. Food expenditures are regressed on income excluding pensions, and on pension income. If the coefficients are the same, it would appear that pension income is treated like other income. If the coefficient on pension income is larger, the recipients are favouring food over other expenditures—as is sometimes found for income controlled by women as opposed to income controlled by men—and if the coefficient is smaller, pension income is being directed in some other way. Although these tests are simple enough in principle, there are a number of practical issues, including choice of functional form, measurement error, the selection of other covariates to include in the regression, and the possible endogeneity of pension incomes if there are unobserved household features that affect both food expenditures and the likelihood of receiving a pension. The last two considerations often go together; for example, household size makes the pension income more likely and increases food expenditure, and it is important that it be included in the regressions.

Table 5 presents evidence from a range of regressions for African households, who receive most of the pension income, whose behaviour is of most interest to us, and on whom we focus for the rest of the paper. In all cases, we regress food expenditure on income excluding pensions and on pension income, while also controlling for household size, the number of people aged 0 to 5, 6 to 15, 16 to 18, 19 to 21, and 22 to 24, the age of the household head, head's age squared, head's years of education, an indicator for a female head, province indicators, and metro/urban/rural indicators. To exclude the effect of a few very large outliers, households reporting non-pension incomes greater than 10,000 rand a month were omitted, as were negative and zero incomes. Including the very high incomes—there are 177 households that report monthly income above this cutoff—depresses the coefficient on income, but does not otherwise much affect the results. The specifications in Table 5, as we move from left to right, differ in their inclusion of the number of age-qualified elderly men and women as determinants of food expenditure, and in their instrumentation for other income (column 3), for other and pension income (column 4), for total income (column 5), and in their use of the number of elderly men and women as instruments for income and pension income (column 6). The final two columns, in the right panel, test the robustness of our results, repeating the specifications of columns 1 and 6 but with income

entered logarithmically; the details will be discussed below. The patterns in this table will recur in similar forms in other cases so we discuss them in some detail.

The first column shows the simplest possible case, an OLS regression of food expenditures on income excluding the pension, on income from the pension, on household size, and on the other controls that are common to all regressions. In this specification, the estimated marginal propensity to spend on food out of pension income is about a third of the estimated marginal propensity to spend on food out of non-pension income. If food is 'good,' pension income is only a third as 'good' as other income. The second column adds the number of age-qualified males and females to the regression. Both coefficients are large and positive although they are jointly insignificant with an F-ratio of 1.80. These coefficients might be positive because the elderly have a preference for food, either for themselves, or on behalf of others, so that the presence of elderly men and women increases food demand by about twice as much as does the presence of a non-elderly person. An alternative interpretation is that the number of elderly people is a good predictor of pension income, indeed so good that there is collinearity between these variables and the pension variable and it is difficult to measure their separate effects. Given that demand equations from other countries rarely show any separate influence for the elderly, the second interpretation is a plausible one. Nevertheless, there can be no general presumption that the numbers of the elderly do not affect household preferences, and since the cash benefit is determined by the numbers of the elderly, identification is always going to be difficult and will have to be argued on a case by case basis.

The third column reports results for the same specification, but with instrumentation for possible measurement error in non-pension income. In the first-stage regression of non-pension income on the instruments and on the other variables in the regression, the F-statistic on the instruments is 39.4. Consistent with the presence of measurement error, the coefficient on income rises by about a quarter, from 0.092 to 0.110. Pension income attracts a positive coefficient, but it is small and insignificantly different from zero. As before there are positive coefficients on the numbers of men and women who are age-qualified for the pension, and as before, there is the suspicion that these estimates are proxying for the pension itself. Testing this suspicion is difficult because it is hard to predict pension income except by the number of age-qualified people, so that we lack convincing instruments. Nevertheless, the instruments that we use for non-pension income also have some ability to predict pension income, with an F-statistic of 50.4 in a first-stage regression. In the resulting second-stage regression, shown as column 4 of the table, pension income has a coefficient that is twice as large as that on non-pension income, but the numbers of age-qualified men and women now have large (insignificant) *negative* coefficients. This regression tells us little more than what we know already, that predicted pensions are collinear with the number of people age-qualified for the pension.

Column 5 is discussed below after looking at column 6, which contains our

Table 5  
*Food Expenditures, Incomes, and the Social Pension, African Households only*

Dependent variable: Household expenditure on food (Rand)									
	No instruments	No instruments	Instrument for non-pension income only	Instrument non-pension and pension income	Instrument total income	Instrument both income sources ( <i>n60 f, n65 m</i> as instruments)	Income in logs:	No instruments	Instrument log(Inc/Mem) and Pension/Inc
Income in levels:	(1)	(2)	(3)	(4)	(5)	(6)		(7)	(8)
Income excl pensions	0.092 (0.008)	0.092 (0.008)	0.110 (0.015)	0.126 (0.025)	–	0.117 (0.015)	log(income per member)	85.39 (6.15)	75.80 (11.96)
Social pension income	0.036 (0.026)	0.002 (0.032)	0.011 (0.033)	0.299 (0.324)	–	0.117 (0.045)	pension share in total income	–106.24 (18.09)	8.99 (35.31)
Total income	–	–	–	–	0.116 (0.016)	–	–	–	–
Household size	42.36 (5.72)	41.14 (5.74)	37.35 (6.02)	32.63 (8.48)	35.58 (6.11)	35.35 (6.15)	log(household size)	259.58 (12.85)	260.75 (14.36)
Number age-eligible females	–	31.11 (16.43)	30.18 (16.58)	–45.57 (84.56)	2.60 (14.4)	–	–	–	–
Number of age-eligible males	–	12.98 (18.84)	16.13 (19.69)	–48.16 (72.52)	–7.22 (17.6)	–	–	–	–
F-test: joint sig of [ <i>n60 f, n65 m</i> ] (p-value)	–	1.80 (0.167)	1.72 (0.181)	0.27 (0.763)	0.10 (0.903)	–	–	–	–
Chi-square test (2) (p-value)	–	–	–	–	–	0.061 (0.970)	–	–	0.157 (0.924)

Notes: Robust standard errors in parentheses for regression coefficients. Numbers of observations are 5,243 in columns (1) - (6) and 5,222 in columns (7) and (8). Regressions in columns (1) - (6) also include the number of household members aged 0–5, 6–15, 16–18, 19–21, 22–24; age of household head; age of head squared; head's years of education; an indicator for female-headed households; old (i.e. pre-election) province indicators; and metro indicators. Regressions in columns (7) - (8) include the fraction of members in age categories 0-5, 6-15, 16-18, 19-21, 22-24; age of head; age of head squared; head's years of education; an indicator for female headed households; province and metro indicators. Income excluding pensions and social pension income are instrumented on indicators that the head of household is present; head is employed; head holds a regular wage job, a casual wage job, a job in agriculture, a job in some other sector; head is paid monthly, fortnightly, weekly; head is a dual job holder, and in column (6) on the number of women aged 60 or above ( $n60f$ ) and the number of men aged 65 or above ( $n65m$ ). The first-stage regressions for non-pension income include all of these instruments, plus the variables included in the main regression. When  $n65m$  and  $n60f$  are in the instrument set, but not in the main regression, the F-statistic for all the instruments is 40.5; when they are in the main regression, and are excluded as instruments, the F-statistic on the other instruments is 39.4. For pension income, the corresponding figures are 74.1 and 50.4. The log(income per capita) and pension share of total income (columns 7 and 8) are instrumented on indicators that the head of household is present; head is employed; head holds a regular wage job, a casual wage job, a job in agriculture, a job in some other sector; head is paid monthly, fortnightly, weekly; head is a dual job holder; and on the fraction of household members that are women aged 60 or above and the fraction that are men aged 65 or above. The F-statistics for these instruments in the first stage regressions for log(income per capita) and pension share are 44.5 and 50.9. Chi-square tests are over-identification tests that, conditional on the validity of the other instruments, the errors in the main regression are orthogonal to the number of women and men in the household age qualified for a social pension (column 6), and the fraction of women and men who are age qualified (column 8). Head's age is the age of the head, if reported; otherwise the age of the head's spouse, if reported; otherwise the age of the oldest household member.

preferred specification for food. In column 6, the elderly are excluded from the main regression, so that we are assuming that elderly people do not affect the demand for food any differently than do prime-age adults. We are thus free to use the numbers of age-qualified men and women as instruments, thus improving the fit of the first stage regressions, especially for pension income, where the F-ratio rises from 50.4 to 74.1. We also use an over identification test of the hypothesis that, conditional on the validity of the other instruments, the numbers of men and women who are age-qualified for the pension belong in the instrument set and not in the main regression. The result is a value of 0.06. The main regression then delivers the result that pension income and non-pension income have the same effect on food expenditures. Both coefficients are significantly different from zero, but not from one another. Although other interpretations are clearly possible, we would argue that the exclusion of the elderly from the main equation is reasonable, as is the assumption that both income and pension income are reported with error, albeit more for the former. Given these, the money from pensions is no different from money from other sources, at least for food expenditures; a rand is a rand whatever its source.

Column 5 looks at the matter in another way. Now we impose that a rand is a rand by combining the two types of income, and then enter once again the numbers of age-qualified men and women. As expected, these have small and insignificant coefficients, judged either separately or in combination. Conditional on a rand being a rand, there is no evidence that the elderly have food preferences any different from other adults.

It is instructive to compare the regression in column 1 with the regression in column 6. The two regressions have the same specification, but the former is estimated by OLS, while the latter is instrumented to allow for measurement error in both reported pension income and in measured non-pension income. If we were to assume that pension income was accurately reported, and instrument only for non-pension income (regression not shown), we get part way to the final result. The coefficient on non-pension income rises to 0.110, close to its final value, and the coefficient on pension income rises from 0.036 to 0.046. Even if pension income were accurately measured, there is the possibility of downward bias in the presence of mis-measured non-pension income, because the receipt of pension income indicates low non-pension income. Even so, there also appears to be misreporting of pension income, so that the instrumentation of both variables is required to bring the estimated coefficients to equality.

## 2.2 *Pension Income and the Disposition of Income*

The disposition of pension income is investigated in Table 6. There are eleven columns in the table; eight expenditure categories, remittances or transfers out of the household, saving defined as explicit contributions, and 'saving' defined as a residual between measured income and measured total consumption. Once again, our two main difficulties are (a) limited variation in pension

Table 6  
*Pension Income and the Disposition of Incomes Among African Households*

	food	clothing	housing	alcohol & tobacco	schooling	transport	health	remittances	insurance	formal saving	residual & other saving
<i>OLS</i>											
<i>Regression</i>											
Non-pension income	0.092 (0.008)	0.027 (0.002)	0.120 (0.018)	0.004 (0.001)	0.026 (0.005)	0.064 (0.006)	0.004 (0.001)	0.022 (0.005)	0.032 (0.003)	0.045 (0.010)	0.508 (0.028)
Pension income	0.032 (0.027)	0.016 (0.004)	0.012 (0.035)	-0.004 (0.005)	-0.003 (0.008)	0.005 (0.012)	0.007 (0.002)	0.010 (0.006)	0.006 (0.007)	0.027 (0.010)	0.877 (0.061)
t-test	2.21	2.51	2.26	1.70	3.21	4.98	1.25	1.77	3.78	2.32	5.35
(p-value)	(0.028)	(0.013)	(0.025)	(0.090)	(0.002)	(0.000)	(0.212)	(0.078)	(0.000)	(0.021)	(0.000)
<i>2SLS</i>											
<i>Regression</i>											
Non-pension income	0.115 (0.016)	0.033 (0.004)	0.060 (0.029)	0.004 (0.003)	0.014 (0.006)	0.061 (0.010)	0.002 (0.002)	0.056 (0.009)	0.038 (0.005)	0.036 (0.008)	0.527 (0.043)
Pension income	0.112 (0.053)	0.024 (0.009)	-0.052 (0.117)	-0.003 (0.010)	-0.010 (0.014)	0.016 (0.026)	0.004 (0.003)	0.033 (0.014)	0.019 (0.009)	0.049 (0.020)	0.799 (0.148)
No of Females 50+	1.93 (21.3)	-5.26 (2.78)	8.86 (10.5)	-5.65 (2.77)	-6.91 (4.34)	-15.2 (7.91)	-1.34 (0.87)	-5.68 (3.79)	4.91 (3.32)	-9.94 (4.26)	27.3 (31.0)
No of Males 50+	-6.37 (14.1)	-5.09 (2.84)	-31.5 (23.2)	-7.65 (2.83)	-9.17 (7.06)	-13.2 (8.54)	-0.129 (1.14)	0.444 (6.28)	-0.930 (4.48)	-13.8 (7.32)	97.9 (36.9)
t-test	0.08	1.09	1.18	0.72	1.53	2.05	0.62	1.61	2.27	0.66	2.07
(p-value)	(0.939)	(0.277)	(0.238)	(0.472)	(0.127)	(0.041)	(0.537)	(0.108)	(0.024)	(0.511)	(0.040)
$\chi^2$ (OID)	0.05	0.15	0.25	0.04	0.24	0.27	0.02	0.02	0.30	0.01	0.29

Notes: Robust standard errors presented in parentheses. The OLS regressions (top panel) also contain the number of women and the number of men aged 50 or above. Both the OLS and the 2SLS regressions (bottom panel) contain the number of household members, the numbers of people aged 0 to 5, 6 to 15, 16 to 18, 19 to 21, 22 to 24, head's age, head's age squared, head's years of completed education, an indicator for female head, and province and urbanisation indicators. The instruments for the first stage regressions are indicators of whether the head is present, is employed, holds a regular job, a casual wage job, a job in agriculture, a job in some other sector, is paid monthly, fortnightly, or weekly, and is a dual job holder, together with the number of people in the household who are age-qualified for the pension. The t-test is a test of equality of the coefficients on pension and non-pension income, and the OID test is a test of the validity of excluding from the main regression the numbers of age-qualified pensioners, conditional on the validity of the other instruments. In the first stage regressions for non-pension income and pension income, the F-statistics for the instruments are 53.84 and 92.47, respectively. There are 5,243 observations.



income conditional on the numbers of elderly, and (b) mis-measurement of income, and the shortage of good predictors of income that can reasonably be assumed not to have a direct effect on the allocation of income. For some of these goods, it makes sense to do as we did for food, and assume that the elderly do not affect consumption directly, but only through the pension, but for others—remittances or expenditures on health—such an assumption cannot be maintained. There are also a number of variables—head's age, head's education, and an indicator that the head is female—that do an excellent job of predicting income and would be good instruments for the measurement error, but which once again cannot safely be assumed not to affect directly the allocation of expenditures.

In computing the estimates in the table, we have tried to avoid controversial assumptions about excluding variables from the main equations, so that, for example, we have not attempted to use age or education as instruments. However, we have made two changes from the treatment of food expenditures in Table 5. We exploit the presumption that tastes should not change just at the precise moment that people become old enough to get the social pension, and include in the main regressions, not the numbers of age-qualified men and women, but the numbers of men and women aged 50 or over. When we instrument pension income, we also combine the numbers of age-qualified men and women into a single measure of the number of age-qualified people. Otherwise, the procedures are the same as for food. The two rows in the top panel of the table show the OLS estimates of the marginal propensities to spend out of non-pension and pension income. These regressions were computed including the full set of controls, but since we are mostly interested in the two propensities, and on how they change with instrumentation, we do not report the other estimates. The rows in the bottom panel show the 2SLS results, with both kinds of income instrumented. We report the two marginal propensities and the coefficients on the numbers of males and females aged 50 or more. We show the t-tests of the hypothesis that the two marginal propensities are the same—as was the case for food—as well as the  $\chi^2$  over-identification test for the legitimacy of the number of age-qualified pensioners as an instrument, conditional on the validity of the other instruments.

The OLS estimates in the first two rows show a repetition of what we found for food, that the marginal propensity to consume out of pension income is estimated to be lower than that out of non-pension income. This is true for all of the expenditure categories except health expenditures and the residual in the last column, which shows that 88% of pension income is allocated at the margin to the residual category, as opposed to 51% of non-pension income. While it is possible that a large share of pension income is saved, these very large estimates almost certainly owe a great deal to the measurement error that is common to both income and residual unallocated income.

Instrumenting for measurement error in the next two rows reduces somewhat the estimated fraction of pension income that goes to 'residual savings.' We estimate that 53% of non-pension income and 80% of pension income are unallocated at the margin; the estimated standard errors are 4.3% and 14.8%

respectively, and the difference is marginally significantly different from zero,  $t = 2.07$ . It would be unwise to treat these numbers as good estimates of the propensity to spend on residual saving; not only does this category include any omitted expenditure categories, but because measurement error in income is directly carried through into this category, the IV estimate, although consistent, is biased towards unity in finite samples.

As was true for food, the marginal propensity to spend out of pension income on other categories is brought closer to the marginal propensity to spend out of non-pension income. For all categories except insurance, the residual, and transport, (and the last two are marginal, especially given the sample size) the t-test cannot reject the equality of the coefficients although, in some cases, the test is helped by the relatively high standard errors induced by the instrumentation. None of the OLS test-statistics lead to rejection at conventional levels. We therefore tend to accept the view that money from the social pension is spent in the same way as other income. Evidence to the contrary is as likely to be a consequence of measurement error as of real differences in behaviour.

There are a number of other noteworthy features of the results. Female-headed households behave differently from male-headed households; most notably, conditional on reported income, they spend less on everything except insurance and clothing, perhaps because being a female head indicates low income even after instrumentation. Female-headed households spend a great deal less on alcohol and tobacco and on transportation; there are also modest negative effects on expenditures on housing, other goods, formal saving and remittances. We estimate relatively modest direct or taste effects of elderly household members on consumption patterns; they spend less on clothing, on alcohol and tobacco, on education, and on transportation. The estimated coefficient of pension income in the schooling equation is negative, but it is not significantly different from the estimated coefficient on non-pension income, so that there is no evidence that the pension income of grandparents is not used to assist the education of grandchildren in three generation families. However, the evidence is somewhat stronger against the view that the elderly favour educational expenditure over other uses of funds. Households with better educated heads also spend differently (results not shown), reporting higher levels of expenditure on everything except remittances and alcohol and tobacco. It is possible that these effects are proxying for higher incomes—in which case education should be included among the instruments rather than among the regressors—or that households with better educated heads provide a fuller and more accurate account of their expenditures.

We have also considered a number of variants of the results in Table 6 that are not shown explicitly. For each expenditure category, we ran regressions corresponding to column 5 in Table 5, imposing the restriction that a rand of pension income is spent in the same way as is a rand of other income. Conditional on the truth of this assumption, we can test for taste differences associated with the presence of the elderly. We find significant negative effects of the elderly on expenditures for schooling, remittances out of the household, and insurance. In Table 6, where the elderly are included only as instruments,

these negative effects are projected onto pension income and appear as differences between the coefficients on pension and non-pension income. Since it is plausible that old people spend less on these commodities, we suspect that the differences are real, although not very important, whether judged by the t-tests in Table 6 or by those on the elderly in the supplementary regressions. However, given the close predictability of the pension by the number of age-qualified people, it is beyond the ability of our data to distinguish an explanation in which the pension is spent differently from other income from one in which all income is spent in the same way at the margin but where there are intercept differences associated with the different tastes of the elderly.

We have repeated the regressions separately for households who live in rural and urban/metropolitan areas. The range of goods available is much wider in urban than in rural areas, and needs, especially food needs, are likely to be different in agriculture from those in urban occupations. We found few differences of any importance. The marginal propensity to spend on remittances and on housing are sharply higher in urban areas, but are still insignificantly different between pension and other income. The large estimated coefficients on income for the unallocated or residual saving category remain as large as before and do not differ between urban and rural households. We also disaggregated pension income by whether the recipient was male or female, but could find no significant differences on the expenditure pattern, whether estimation was by OLS or IV.

In the final columns of Table 5 and in Table 7 we explore the sensitivity of our results to a number of alternative methods of estimation. The right hand panel of Table 5 tests a logarithmic form for income and household size instead of the linear form used in our results so far. Because many people have no income other than pension income, we cannot work with the logarithm of non-pension income without losing many observations. Instead, we regress food expenditure on the logarithm of *total* income, on the ratio of pension to total income, and on the logarithm of household size. The idea is that the relevant income variable is the sum of non-pension income plus  $\beta$  times pension income, divided by some power of household size,  $n$ . Taking logarithms and approximating gives

$$\begin{aligned} & \ln[(y_n + \beta y_p)/n^\theta] \\ & = \ln\{[y + (\beta - 1)y_p]/n^\theta\} \approx \ln(y/n) + (\beta - 1)y_p/y + (1 - \theta)\ln n \quad (1) \end{aligned}$$

where  $y$  is total income, and  $y_n$  and  $y_p$  are non-pension and pension income respectively. The results in Table 5 show that this logarithmic functional form replicates the results for the linear model. In the OLS results in column (7), the coefficient on the pension income ratio is close to being equal and opposite the coefficient on all income which, according to (1), means that  $\beta = 0$ , and pension income has no effect on expenditure. Once we instrument in column (8), the coefficient on the ratio moves close to zero, which makes  $\beta = 1$  so that pension income is spent like non-pension income. Once again, instrumentation for measurement error makes the evidence consistent with the supposition that a rand is a rand.

Table 7  
*Alternative Specifications, African Households*

	food	clothing	housing	alcohol & tobacco	schooling	transport	health	insurance	formal saving
<i>Powell CLAD</i>									
Non-pension income	0.093 (0.006)	0.023 (0.001)	0.057 (0.004)	0.003 (0.001)	0.005 (0.001)	0.046 (0.002)	0.001 (0.000)	n.a.	n.a.
Pension income	0.048 (0.024)	0.016 (0.003)	0.036 (0.009)	-0.009 (0.003)	0.003 (0.002)	0.003 (0.003)	0.001 (0.000)		
t-test (p-value)	1.82 (0.0686)	2.76 (0.0057)	2.26 (0.0241)	4.34 (0.0000)	1.27 (0.2032)	12.24 (0.0000)	0.00 (0.9889)		
Number obs, last iteration	5243	5135	5241	4852	4446	4701	4934		
<i>Tobit Estimates</i>									
Non-pension income	0.092 (0.004)	0.030 (0.001)	0.120 (0.006)	0.005 (0.002)	0.033 (0.002)	0.078 (0.003)	0.006 (0.001)	0.079 (0.004)	0.109 (0.006)
Pension income	0.036 (0.023)	0.017 (0.006)	0.019 (0.037)	-0.016 (0.009)	0.001 (0.013)	-0.025 (0.019)	0.009 (0.003)	0.056 (0.025)	0.069 (0.045)
t-test (p-value)	2.42 (0.015)	2.00 (0.045)	2.78 (0.006)	2.29 (0.022)	2.40 (0.017)	5.52 (0.000)	1.08 (0.280)	0.88 (0.377)	0.89 (0.373)
Proportion with positive purchase	1.0	0.79	1.0	0.55	0.61	0.68	0.56	0.20	0.23

Notes: Standard errors in parentheses. The Powell CLAD estimator is Powell's censored least absolute deviation estimator, calculated as repeated application of median regression, where predicted values at each iteration are used to truncate the sample, so that only observations with non-negative predicted values are carried forward to the next iteration. 11 iterations were performed for each good. Final CLAD standard errors were bootstrapped (50 replications). In both CLAD and Tobit estimation, controls also include the number of household members, the numbers of people aged 0 to 5, 6 to 15, 16 to 18, 19 to 21, 22 to 24, head's age, head's age squared, head's years of completed education, an indicator for female head, and province and urbanisation indicators. Tobit estimation contained 5,243 observations.

The results in Table 7 show our attempt to deal with the fact that, for many of the non-food items, a fraction of households report no purchases. The last row of the table shows that the proportion of households buying anything of the category varies from 20% for insurance to 100% for housing. When OLS would otherwise be appropriate, the presence of zero purchases is often dealt with by estimating Tobits, which are here displayed (with non-robust standard errors) in the bottom panel. However, and even before we try to deal with the measurement error, we note that Tobit estimates are not consistent in the presence of heteroscedasticity, something that is usually present in household expenditure data because richer households not only buy more on average, but have more variable purchases around the mean. An alternative estimation technique is Powell's (1984) censored least absolute deviations (CLAD) estimator, which delivers consistent estimators for the Tobit model on the assumption that the distribution of residuals is symmetric, but not necessarily homoscedastic or normal. Except for insurance and saving, where our algorithm broke down, we show the estimates together with bootstrapped standard errors in the top panel of Table 7. However, one reason that households report zero purchases is not that they never purchase, but because they purchase sufficiently infrequently not to have made a purchase during the recall period of the survey. In the simplest example, everyone 'stocks-up' once every fortnight so that, with a reference period of a week, half of the households buy twice their consumption level, and half the households buy nothing at all. Provided there is no relationship between purchase frequency and the explanatory variables, and if frequency of purchase is the only reason for zeros, it is easy to show that OLS is consistent and that both Tobit and Powell's CLAD are inconsistent. Since our survey data almost certainly have some zeros from Tobit-type censoring, and some from infrequency of purchase, none of these estimators is consistent, even in the absence of measurement error in income. This leaves us without a consistent estimator. However, it provides some justification for our basic strategy of estimating OLS and IV, not in an attempt to recover a structural model of intensive and extensive margins of purchase, but to investigate whether pension and non-pension income have different effects in the regression function, recognising that the function itself is a hybrid compounded from the choice whether to purchase, and the choice of how much.

For what they are worth, both the Powell and Tobit estimates in Table 7 replicate the OLS findings of (apparently) significant differences in the disposition of pension and non-pension income, with the former typically generating less spending than the latter. The Tobit estimates of both coefficients are usually larger than the OLS coefficients in Table 6, and are more so the smaller the fraction of purchasers, a result that is consistent both with a frequency of purchase explanation and with genuine censoring. There is no clear pattern in the CLAD estimators, perhaps reflecting the relative imprecision of the technique. Neither set of estimates can be used to show that our OLS results are misleading, and we can hope that the same would be true for our IV estimates if it were possible to use a technique that allowed for zeros in a fully appropriate way.

We have also considered the relationship between pension income and other

direct measures of economic status, including the ownership of various durable goods—cars, refrigerators, stoves, radios, televisions, and telephones—as well as the health status of infants—measured as standardised height for age, weight for age, and weight for height scores. On the grounds that pensions might change the cost-benefit calculations for health treatment, we also looked at whether pension receipt made it more likely that people who were sick were treated by a doctor or at a hospital as opposed to not at all, or by a traditional healer. Crude correlations show a negative relationship between pension receipt and some of these indicators. For example, the standardised height for age score for African children aged up to 60 months is  $-1.16$  in non-pension households, and  $-1.39$  in pensioner households; the difference has a  $t$ -value of  $2.35$  after allowing for intrahousehold correlations. But pensioner households are poorer than non-pension households, and their heads are generally much less well educated. Household income has a modest positive effect on indicators of child nutrition, and a much larger effect on the ownership of the various durable goods. Head's years of education has a positive effect on both sets of measures. We found no consistent effects of pension income on any of the measures although, for the health measures, it is difficult to find any significant effects once incomes are instrumented. We can certainly accept the hypothesis that pension and non-pension incomes have the same effect, but the result is not informative given the imprecision of the estimates.

These final results are hardly surprising. At the time of the survey, the pension had been operating in full for less than a year so that it would not have had time to have much effect on the stocks of durable goods or of child health, which are the accumulated result of decisions and events over several years.

### 3. Conclusions

The South African social pension is an example of a transfer scheme where eligibility is determined by age. In spite of the simplicity of the targeting indicator, the pension is effective in reaching the poorest households and those with children. African households whose per capita income places them at the 5th percentile of African households receive around 175 rand per month on average, while those at the 95th percentile receive almost nothing. These outcomes do not depend on the ability to assess income or wealth to operate a means test. Although the pension is in principle subject to a means test, its effect is mostly to exclude Whites; the distributional consequences among African households would be almost the same if take-up were universal. Because of differential life-expectancy and differences in the age qualification, pensions reach almost three times as many women as men, and because of South African living arrangements, pensions are also effective in reaching the households in which children live. Large fractions of the poorest children live in households that receive pension income. The South African authorities have overcome the difficulties of making cash transfers to even remote rural areas, and of checking eligibility among even illiterate pensioners.

As always, the behavioural effects of the scheme are harder to assess than the

characteristics of its recipients. Simple correlations and regressions have a tendency to link pension receipt with undesirable outcomes, but these results can reasonably be attributed to the fact that pension recipients are different from others—in particular they are poorer and less well educated—or more subtly, to measurement error in income, so that even conditional on low measured income, the receipt of the pension may indicate low economic status. Our results in this paper are consistent with the view that pension income is spent in much the same way as other income. Since pension income usually accrues to the head of household who may also be the main decision maker, this conclusion is perhaps to be expected. Even so, without the social pension, an elderly head of household would often not be the principal earner, and it has been claimed that decision-making powers are linked to earnings. And while the distinction between pension and non-pension income does not seem to be very important, we do find evidence that expenditure patterns are different for different types of households. Female-headed households spend a lot less on alcohol and tobacco, and the presence of elderly household members turns expenditure away from transportation and from schooling. The finding on alcohol and tobacco suggests that women have different tastes from men, and is evidence against simple unitary models of household decision-making. That the elderly travel less (presumably to work) and spend less on education is hardly a surprise, but it shows that such differences do not automatically rule out unitary decision making.

Our behavioural analysis is limited by the short time since the full pension was introduced. Some consequences, such as health status, the possession of durable goods, or living arrangements, will take time to adapt, and will have to be re-examined in later work. We have also not considered the effects of the social pension on private transfers (remittances) into the recipient households. If there are important compensatory effects—and there is some evidence of this from other countries, Cox and Jimenez (1995)—then at least some of the benefits of the pensions are accruing to younger and presumably better-off people, so that the progressivity of the scheme will be less than indicated by the immediate incidence analysed here.

There are two methodological issues that run through our analysis and that are worth restating. The first is the danger of interpreting simple correlations and regressions without adequate consideration of likely biases. Omitted heterogeneity is an obvious problem—the recipients of state transfers are *designed* to be different from non-recipients—but as important, and perhaps less obvious, is the fact that measurement error may preclude regression analysis from providing adequate controls, even for observable covariates such as income. The second issue is the problem of measuring the effects of a programme that is determined by individual or household characteristics. If unemployment benefits, food stamps, or pensions are a function of circumstances and household characteristics, and if those characteristics have a direct influence on behaviour, then the behavioural consequences of the programme are not identified. In some applications, the lack of identification may be masked by the failure of the formula to characterise benefits precisely, so that estimation is possible, even though the

sources of identification and the interpretation of the results are far from clear. In the case of the South African pension, the take-up of pensions among qualified Africans is so nearly universal that the formula is close to the reality, and the identification problem is stark and inevitable.

*Princeton University*

*Date of receipt of first submission: January 1997*

*Date of receipt of final typescript: February 1998*

## References

- Akerlof, George (1978). 'The economics of 'tagging' as applied to the optimal income tax, welfare programs, and manpower planning.' *American Economic Review*, vol. 68, (1), pp. 8–19.
- Ambrogi, Donna Myers (1994). 'Retirement income of the elderly poor in South Africa: some legal and public policy issues' mimeo (October)
- Ardington, Libby and Lund, Francie (1994). 'Pensions and development: the social security system as a complementary track to programs of reconstruction and development.' Centre for Social and Development Studies, University of Natal, Durban, processed. (July.)
- Bourguignon, François and Chiappori, Pierre-André (1992). 'Collective models of household behavior, an introduction.' *European Economic Review*, vol. 36, pp. 355–64.
- Browning, Martin, Bourguignon, François, Chiappori, Pierre-André and Lechene, Valerie (1994). 'Income and outcomes: a structural model of intrahousehold allocation.' *Journal of Political Economy*, vol. 102, pp. 1067–96.
- Coate, Stephen (1989). 'Cash versus direct food relief.' *Journal of Development Economics*, vol. 30, pp. 199–224.
- Cox, Donald and Jimenez, Emmanuel (1995). 'Private transfers and the effectiveness of public income redistribution in the Philippines.' in (Dominique van de Walle and Kimberley Nead, eds., ) *Public Spending and the Poor: Theory and Evidence*, Baltimore, Md., Johns Hopkins University for the World Bank, pp. 321–46.
- Deaton, Angus and Paxson, Christina (1997). 'Poverty among children and the elderly in developing countries.' Princeton, NJ. Research Program in Development Studies, mimeo (November.)
- Drèze, Jean and Sen, Amartya (1989). *Hunger and Public Action*, Oxford: Clarendon Press.
- Fan, Jianqing (1992). 'Design-adaptive nonparametric regression.' *Journal of the American Statistical Association*, vol. 87, pp. 998–1004.
- Garfinkel, Irwin (1973). 'Is in-kind redistribution efficient?' *Quarterly Journal of Economics*, vol. 87, no. 2, pp. 320–30.
- Guesnerie, Roger and Roberts, Kevin (1984). 'Effective policy tools and quantity controls.' *Econometrica*, vol. 52, (1), pp. 59–86.
- Haddad, Lawrence and Kanbur, Ravi (1993). 'The value of intrahousehold survey data for age-based nutritional targeting.' *Annales d'Economie et de Statistique*, vol. 0, (29), pp. 65–81.
- Haveman, Robert and Wolfe, Barbara (1995). 'The determinants of children's attainments: a review of methods and findings.' *Journal of Economic Literature*, vol. 33, pp. 1828–78.
- Hill, M. Anne, and O'Neill, June (1994). 'Family endowments and the achievement of young children with special reference to the underclass.' *Journal of Human Resources*, vol. 29, pp. 1064–100.
- Jensen, Robert. (1997). 'Pubic transfers, private transfers and the 'crowding out' hypothesis: theory and evidence from South Africa.' Department of Economics, Princeton University. mimeo.
- Lund, Frances. (1993). 'State social benefits in South Africa,' *International Social Security Review*, vol. 46, pp. 5–25.
- Nichols, Albert L., and Zeckhauser, Richard J. (1982). 'Targeting transfers through restrictions on recipients.' *American Economic Review, papers and proceedings*, vol. 72, (2), pp. 372–7.
- Powell, James L. (1984). 'Least absolute deviations estimation for the censored regression model.' *Journal of Econometrics*, vol. 25, pp. 303–25.
- Roberts, Kevin. (1984). 'The theoretical limits to redistribution.' *Review of Economic Studies*, vol. 51, (2), pp. 177–95.
- van der Berg, Servaas. (1994). 'Issues in South African social security.' The World Bank, mimeo (May).
- World Bank. (1990). *World Development Report*, Washington, D.C.
- World Bank (1994), *Averting the Old-age Crisis: Policies to Protect the Old and Promote Growth*, Oxford University Press for the World Bank.