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# The effect of transfers on household expenditure patterns and poverty in South Africa

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**Abstract**

This paper uses household level unit record data from South Africa to examine the behavioural and welfare impacts of private and public transfers. We allow for joint endogeneity of resource variables and the expenditure shares. Our results show that crowding out of private transfers as a result of the introduction of public pensions holds only for poor households and not for the non-poor. Both private transfers and public pensions significantly reduce poverty but private transfers have a larger impact on expenditure patterns. The results also reject the hypothesis of income pooling underlying the conventional unitary model by finding that the marginal impact on expenditures are different for public pension received, private transfer received and other resources flowing into the household. The principal conclusions are robust to changes in specification.


*JEL classification:* I32; I38; D12; C32
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## 1. Introduction

Notwithstanding a large recent literature on private inter household transfers and public pensions in developing countries, relatively little attention has been paid to studying the effect of such transfers on household expenditure patterns and their impact on household welfare and poverty.[1] An analysis of the behavioural impacts of transfers, both public and

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[1] In a recent paper, Ezemenari and Subbarao (1999) examine the impact of the food stamp program on the poverty gap in Jamaica. However, they do not examine the behavioural impacts of either the program or of private transfers on household expenditure patterns. Case and Deaton (1998) examine the behavioural impacts of public pensions in South Africa but disregard private transfers in their analysis.

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private, is of considerable significance since they often form an important component of total household income. The principal motivation of this paper is to fill this gap using household level data from South Africa.

The interest in the South African experience stems from the long history of private transfers in that country. There also exists a formal means tested social pensions program, and the two kinds of transfers (private and public) together often constitute a significant component of total household income. Moreover, the social aspect and the existence of apartheid as a legally sanctioned practice with consequences for migration and remittance makes analysis of the South African data set one of considerable policy interest.

Black households in rural South Africa have long been dependent on income transfers from members working away from home in mines, factories and plantations.[2] After the dismantling of apartheid restrictions on residence, property ownership and movement are no longer enforced, but the oscillatory migrant labour system continues to exist even today for a variety of economic and social reasons such as the lack of employment opportunities in rural areas where most Blacks reside, high costs of relocating to employment centres, a shortage of housing in these areas and a desire of the Blacks to retain their cultural and tribal ties to the rural areas.

The universal social pension scheme in South Africa on the other hand is a relatively recent development. A system of public support for the elderly and unemployed Whites had been in place for many years, but it is only with the recent demise of apartheid and the demand for equal coverage and racial parity that the system has been extended to include Non-Whites. The maximum benefit in 1993 was Rand (R) 370 a month and is paid to all women above the age of 60 and all men above the age of 65, subject to a "means" test.[3] Case and Deaton (1998) and Lund (1993) provide surveys of social transfer programs in South Africa in general and the pension arrangements in particular.

This paper attempts to answer the following important questions:

1. What are the principal socio-economic determinants of income, pensions and transfers? Can these be considered 'exogenous' in the estimated budget share equations, or should they be jointly determined along with commodity demand?

[2] During the era of apartheid, South Africa's ruling National party officially classified all individuals as falling into one of four races: Black (African), Coloured (Mixed Race), Indian (Asian) and White (Caucasian). To maintain consistency with the data (and the existing literature), this paper will stick to this terminology. The White government forced Black South Africans into "homelands" which were desolate regions incapable of sustaining a livelihood based on agriculture thereby creating a massive pool of unemployed Black workers who were employed in the mines and in the White owned agricultural farms. The migrant workers were forced to live away from their families, remitting home cash and goods to support their families. This was known as the "oscillatory migrant labour system" (see Wilson, 1972 for a description).

[3] For a single age qualified individual (who satisfies the age requirement) the "means" is defined as the sum of income and the imputed value of income generating assets. The pension is reduced one for one when the means exceed R 90 a month until the means reach R 370 a month beyond which pension payment stops. For age-qualified couples, the means is calculated by pooling and dividing income and the imputed value of income generating assets by two. Note that, in particular, the means test does not take into account the income of the other members of the household. By 1999, the monthly pension payout had risen to R 520 a month.

2. What are the behavioural and welfare implications of transfers and pensions, specially, from the viewpoint of poverty alleviation? How different are the resource flow variables in terms of their impact on household expenditure patterns?
3. How sensitive are the results to the presence of economies of scale of household size?
4. Are there significant racial differences with respect to expenditure patterns, transfers and pensions?

To answer these questions, we consider an 11-item dis-aggregation of household consumption expenditure. We estimate a system of equations, where the endogenous variables are per-adult equivalent household income, public pension and private transfer received by the household and the expenditure shares. The endogeneity of resource flows into the household, along with that of the household's poverty status, is a major point of departure of our paper from the existing literature, which has traditionally assumed such resource flows as being exogenously given. We find that the null hypothesis of exogeneity of the resource flows is rejected, so the assumption that resource flows are exogenously given, would result in the system being mis-specified and the results misleading. We deflate household income, public pension and private transfer by the equivalence scale to account for the possible effects of household size economies on consumption expenditure patterns within the household. This is particularly important because it has recently been observed that poverty estimates are significantly affected by household economies of scale.

Let us briefly summarise our results. We find that public and private transfers received by the household sharply reduce the incidence of poverty. Private transfers have a significant impact on household expenditure patterns—in particular, private transfers received by the household significantly increase the budget shares of necessities like Food and Clothing. In contrast, public pensions do not have much of an impact on household expenditure patterns. In a departure from conventional demand analysis, we allow both a discrete effect (through a poverty dummy) and a continuous effect of changing household resources on its expenditure pattern. Our results show that the poor have a fundamentally different expenditure pattern from the non-poor, something that is not adequately captured by the use of only the income variable. We find that private transfers, public pensions and other resources flowing into the household have very different impacts on household expenditure patterns. We argue that that this is a rejection of the hypothesis of income pooling by the different members of the household. Finally, it is generally argued that public pensions and private transfers are substitutes, with the former crowding out the latter. However, most other studies of transfers estimate the determinants of private transfers independently, not only of income but also of public transfers. In this paper, we relax the assumption of exogeneity of public transfers and income when estimating the determinants of private transfers. Indeed, when we account for the endogeneity of public pensions in the private transfers equation, we find that the results are quite different from those obtained in earlier studies. In particular, the result on crowding out of private transfers as a result of public pensions needs to be qualified—we find the evidence in favour of such crowding out only in the case of households below the poverty line. Moreover, we find that for the non-poor households, public and private transfers are complements.

Our paper contributes to the literature in several ways. First while there exists a fairly large literature on the determinants of transfers received by households (see, for example, Cox and Jimenez, 1995; Cox et al., 1998; Jensen, 1998), this is the first paper that analyses the impact of such transfers on poverty and household expenditure patterns, specially in a complete systems framework where the possible endogeneity of resource flows into the household is taken into account in the estimation. Second, most other studies of transfers estimate the determinants of private transfers independently, not only of income but also of public pensions. In this paper, we question the assumption of exogeneity of public pensions and income when estimating the determinants of private transfers. When we account for the endogeneity of public pensions in the private transfers equation, we find that the results are quite different from those obtained in earlier studies. Third, in estimating the incidence of poverty, we take into account household economies of scale. Not doing so leads to mis-specification and underestimation of the incidence of poverty. Finally, we find that income, private transfers and public pension have very different behavioural impacts. This deviates from the widely held view that there are no differences in the behavioural impacts of pension and non-pension income (see, for example, Case and Deaton, 1998). We try to provide possible explanations for this behaviour.

The rest of this paper is organised as follows. Section 2 presents the theoretical framework and estimation procedure, the methodology for estimating equivalence scales and for defining the poverty line in the presence of economies of household size. Section 3 describes the data. The results are presented and discussed in Section 4. The concluding comments are in Section 5.

## 2. Methodology

A key empirical question that we seek to answer in this paper is: Do pensions, private transfers and other resource flows into the household have different behavioural impacts? This is an important issue because Case and Deaton (1998) using the same data set from South Africa find that "a Rand of pension income is spent in the same way as a Rand of other income" (p. 1355) and that "a Rand is a Rand" (p. 1333). This is quite a surprising result because typically pension and non-pension income accrue to different members of the household often belonging to different generations and therefore having very different preferences. So the observed hypothesis of identical effects of pension and non-pension income implies that there is pooling of income within the household. Further, the analysis of Case and Deaton (1998) does not take into account private transfers received by the household and to the extent that private transfers and public pensions perform roughly similar functions, there is likely to be some crowding out the former by the latter. The effect of pensions will therefore be overestimated if we do not take private transfers into account.

To put this argument into a theoretical perspective, we recall the distinction between non-unitary and unitary household models. While unitary models treat the household as a single decision making unit, the non-unitary models not only allow heterogeneity of preferences of individuals within the household but they, also, take explicit account of individual members' welfare or utility in specifying aggregate household utility in order to maximise household welfare.

Let us present, briefly, the non-unitary model. Consider a household consisting of $S$ members. The utility of each member, $U^s$, depends on the commodity consumption of all the household members, namely, $x=\{x_{is}\}$, $i=1,\ldots,I$; $s=1,\ldots S$ where $i$ indexes commodity, $s$ indexes the individual. Hence, $U^s=U^s(x;\theta,\varepsilon)$ where $\theta$, $\varepsilon$ denote the set of household and individual level characteristics. The household welfare function is given by:

$$W = W\left[\{U^s(x;\theta,\varepsilon)\}_{s=1}^{S}\right] \tag{1}$$

The household maximises $W$ subject to the income constraint:

$$p'X = \sum_{s=1}^{S} I_s \tag{2}$$

where $p$ denotes the price vector (assumed to be fixed exogenously), $X$ is the vector of aggregate demand $\left(X_i=\sum_s x_{is}\right)$ and $I_s$ denotes the income accruing to individual $s$. Maximising Eq. (1) with respect to Eq. (2) gives a set of reduced form demand functions for $x_{is}$:

$$x_{is} = x_{is}(I_1,\ldots,I_s;p,\theta,\varepsilon_{ks}) \tag{3}$$

There are two broad approaches to the formulation of non-unitary models depending on the assumed functional form for $W$ in Eq. (1) above. The first includes the "bargaining models" of the household (Manser and Brown, 1980; McElroy and Horney, 1981), which specifies $W$ as:

$$W = \prod_{s=1}^{S}[U^s(x;\theta,\varepsilon) - V^s(p,\tilde{\theta})] \tag{4}$$

where $V^s$ is individual $s$'s "reservation utility" for her/him to stay in the household expressed as a function of prices $p$ and a set of characteristics, $\theta$, that enables $s$ to assert her/his independence. The second, the "collective approach" (see, for example, Chiappori, 1988), specifies $W$ as a weighted function of individual utilities, so that:

$$W = \sum_{s=1}^{S} \lambda^s U^s(x;\theta,\varepsilon), \sum_{s=1}^{S} \lambda^s = 1 \tag{5}$$

The weights, $\lambda^s$, which could depend on (besides variables such as prices and individual characteristics) the income share of $s$, will affect the form in which the individual resource variables, $I_1,\ldots,I_S$, enter the demand function (Eq. (3)). More importantly, the dependence of $\lambda^s$ on the distribution of income within the household ensures that the marginal impact of income on demand will vary with the income source. Now, since we do not observe individual consumption of goods, we aggregate Eq. (3) over the $S$ individuals to obtain:

$$x_i = \sum_{s=1}^{S} x_{is} = x_i(I_1,\ldots,I_s;p,\theta,\varepsilon) \tag{6}$$

Note that the alternative household welfare functions, Eqs. (4) and (5), lead to observationally equivalent non-unitary demand functions given by Eq. (6). Whether the demand

function is generated by the "bargaining model" or the "collective model" is not important in the context of the present study. What is important is to note that irrespective of what form of non-unitary household model we consider, the distribution of income within the household matters, so that $(\partial x_i/\partial I_m) \neq (\partial x_i/\partial I_n)$ for $m \neq n$. Compare this to the unitary household model where all that matters is the aggregate income from the different sources $\left(\sum_{s=1}^{S} I_s\right)$—it does not matter who receives the income. In that case, the demand functions can be written as:

$$x_i = x_i\left(\sum_{s=1}^{S} I_s; p, \theta, \varepsilon\right) \tag{7}$$

so that $(\partial x_i/\partial I_m) = (\partial x_i/\partial I_n)$ for $m \neq n$. Clearly, Eq. (7) is obtained as a special case of Eq. (6) when the pooling restrictions are satisfied.

Let us now assume that income is accrued from three different sources ($S = 3$)—social pension ($P$), private transfer ($R$) and all other income ($Y$), so that we can write the demand function (Eq. (6)) as

$$x_i = x_i(P, R, Y; p, \theta, \varepsilon) \tag{7a}$$

In a cross-section data set, the price vector $p$ can be treated as constant.[4] The existing literature has typically estimated versions of Eq. (7a) assuming the $Y$, $P$ and $R$ are exogenous. In this paper, we move away from the assumption of exogeneity of the resource flow variables. Indexing households by $h$, the set of estimating equations is given by:

$$Y^h = f_1(z_1^h, e_1^h, c_1^h; \theta_1) + u_1^h \tag{8}$$

$$P^h = f_2(\underline{Y^h}, z_2^h, e_2^h, c_2^h; \theta_2) + u_2^h \tag{9}$$

$$R^h = f_3(\underline{Y^h}, \underline{P^h}, z_3^h, e_3^h, c_3^h; \theta_3) + u_3^h \tag{10}$$

$$w_i^h = f_4(\underline{Y^h}, \underline{P^h}, \underline{R^h}, z_4^h, e_4^h, c_4^h; \theta_4) + u_{4i}^h, \quad i = 1, \ldots, n \tag{11}$$

where $w_i^h$ denotes the budget share of item $i$ in household $h$ so that $w_i^h = x_i^h/x^h, x^h = \sum_i x_i^h$. The $z$, $c$ and $e$ denote, respectively, $h$'s vector of demographic/educational, asset and community/region of residence characteristics entering the Eqs. (8)–(11) as predetermined variables. The $\theta$'s denote the parameter vectors. Eqs. (8)–(11) constitute a set of $(n+3)$ simultaneous equations of which only $(n+2)$ are independent because of the adding up conditions on the budget share equations. The endogenous variables on the right hand side of Eqs. (8)–(11) have been underlined.

[4] Observe that in the unitary household model all that matters is $P+R+Y$ and not $P$, $R$ and $Y$ separately.

Eqs. (8)–(11) reflect a four-stage decision process for the household. In stage 1, households learn the magnitude of their income from the different sources, namely, earned income, agricultural profits and income from enterprises, as a function of a set of household characteristics (Eq. (8)). In stage 2, conditional on household income determined in stage 1, i.e., subject to a 'means' test, household members (i.e., males aged 65 or higher and females aged 60 or higher) receive social pension (Eq. (9)). The provision of the 'means test' in the South African social pensions scheme makes the social pensions variable, $P$, depend on non-transfer household income, $Y$. In stage 3, conditional on the resource inflow determined in the previous two stages, individual members decide on whether to migrate and therefore determined the amount of private transfers that the household receives (Eq. (10)). Finally, in stage 4, the household decides on the expenditure allocation (Eq. (11)).

Note that while the recursive system, Eqs. (8)–(11), is carefully chosen to aid identification and achieve efficiency in estimation, it is *not* the only possible characterisation. For example, while Eq. (10) allows us to examine the crowding out of private by public transfers, an issue that is central to this paper, the recursive system used here does not allow the dependence of income on public or private transfer. We examine the robustness of the principal qualitative conclusions of the paper and follow the suggestions of the anonymous referee and re-estimate the model by departing from the recursive system described above and allowing (non-transfer) household income to depend on the transfer variables as well.

The budget shares, $w_i$, in Eq. (11) correspond to the 11-item breakdown of consumer expenditure: Food, Alcohol and Tobacco, Entertainment, Health, Education, Fuel, Clothing, Child-care, Food Eaten Outside Home, Transfer sent to other households and Other Items. The last category, namely ''Other Items'', constitutes the omitted category. The other jointly endogenous variables, $Y$, $P$, $R$, are defined in per equivalent adult terms by deflating the corresponding aggregate household values of these variables by the equivalence scales, $m_0$, whose estimation is described below. The income equation (Eq. (8)) corrects both for endogeneity and possible measurement error in income. In the budget share equations, we include squares of $Y$, $P$ and $R$ (YSQ, PSQ and RSQ, respectively). We also include a poverty dummy (POV), which is defined below. We include three race dummies (BLACK, COLOURED and INDIAN) and also a set of interaction terms interacting race with the resource flow variables and interacting poverty status with the resource flow variables (INT1–INT7).[5] The regressions also control for the demographic and educational characteristics of the household head (age, sex and highest education attained), household composition (number of children, number of adults and number of elderly) and region of residence that include a set of province dummies corresponding to the pre-1994 provinces (and have since changed). Table 1 contains a description of the variables used in the estimation.

Traditionally, Eqs. (8)–(11) have been estimated independently assuming exogeneity of the resource flow variables. Such an approach ignores the simultaneity of the $(n+2)$

[5] INT1 = $R$*BLACK; INT2 = $P$*BLACK; INT3 = $Y$*BLACK; INT4 = $R$*POV; INT5 = $P$*POV; INT6 = $Y$*POV; INT7 = MAXED*BLACK. Here MAXED measures the years of schooling of the most educated member of the household.

Table 1
Description of the variables used

| Variable | Description |
|---|---|
| POV | = 1, if Household lies below the poverty line, 0 otherwise. Poverty Line defined in per-adult equivalence terms. |
| $R$ | Per Adult Equivalent Private Transfer Received by the Household in the past month |
| $P$ | Per Adult Equivalent Public Pension Received by the Household in the past month |
| $Y$ | Per Adult Equivalent monthly household income |
| RSQ | $(R)^2$ |
| PSQ | $(P)^2$ |
| YSQ | $(Y)^2$ |
| No. of Children | Number of members aged 0–17 |
| Number of Adults | Number of males aged 18–64 and number of females aged 18–59 |
| Number of Elderly | Number of males aged 65 and over and number of females aged 60 and over |
| PENS_H | = 1 if the household head receives pension, 0 otherwise |
| AGEHEAD | Age of Household head |
| AGE2HEAD | $(\text{AGEHEAD})^2$ |
| SEXHEAD | = 1 if the head of the household is a male, 0 otherwise |
| NOEDUC | = 1 if the head of the household has no education, 0 otherwise (reference category) |
| PRIMSCH | = 1 if the head of the household has attended primary school, 0 otherwise |
| PRIMPLUS | = 1 if the head of the household has completed primary school, 0 otherwise |
| SECONDAR | = 1 if the head of the household has completed secondary school, 0 otherwise |
| MAXED | Highest level of education attained by any member of the household |
| RURAL | = 1 if the household lives in a rural area, 0 otherwise |
| BLACK | = 1 if the household is Black, 0 otherwise |
| COLOURED | = 1 if the household is Coloured, 0 otherwise |
| INDIAN | = 1 if the household is Indian, 0 otherwise |
| WHITE | = 1 if the household is White, 0 otherwise (reference category) |
| DUNEMP | = 1 if any adult member of the household is unemployed, 0 otherwise |
| DSICK | = 1 if any adult member of the household is sick, 0 otherwise |
| DPREG | = 1 if any adult female member of the household is pregnant, 0 otherwise |
| WSOURCE | Source of water |
| TOILET_C | Kind of toilet facility available |
| CAR | = 1 if the household has car, 0 otherwise |
| RADIO | = 1 if the household has radio, 0 otherwise |
| FRIDGE | = 1 if the household has fridge, 0 otherwise |
| STOVE | = 1 if the household has stove, 0 otherwise |
| INT1 | $R$∗BLACK |
| INT2 | $P$∗BLACK |
| INT3 | $Y$∗BLACK |
| INT4 | $R$∗POV |
| INT5 | $P$∗POV |
| INT6 | $Y$∗POV |
| INT7 | MAXED∗BLACK |

equations and, especially, the correlation between the errors in the various equations. In this paper we estimate Eqs. (8)–(11) as a system of equations. The three-stage least squares (3SLS) procedure employed here takes into account this simultaneity and the feedback between the various error terms. In particular, the 3SLS system allows for a non-diagonal covariance matrix of disturbances in the joint estimation of the system of equations.

The equivalence scales, required for deflating the resource variables and for setting the poverty line, were obtained from an estimation of the following quadratic demand system, expressed in budget share form, $w_i$ (see Lancaster and Ray, 1998; Maitra and Ray, 1999 for details).

$$w_i = \alpha_i + \beta_i[\log x^R] + \lambda_i[\log x^R]^2 + v_i, \quad i = 1, \ldots, n \tag{12}$$

where $x^R = x/m_0$ is the household expenditure per equivalent adult, $m_0$ is the equivalence scale, and $\Sigma\beta_i = \Sigma\lambda_i = 0$, $\Sigma\alpha_i = 1$. Now $m_0 = \left(n_a + \sum_s \sum_d \theta_{ds} n_{ds}\right)^{\phi}$, where $n_a$ is the number of adults, and $n_{ds}$ is the number of children in age group $d$, gender $s$ in the household. The functional parameters of the equivalence scales $(\theta_{ds},\phi)$ were initially estimated in a maximum likelihood estimation of equation system (11) on the following five item dis-aggregation of consumer expenditure: Food, Medical, Clothing, Fuel and Power, and Others. The equivalence scale parameters were, then, fixed at their estimated levels in the 3SLS estimation of the system of Eqs. (8)–(11).

The poverty variable (POV) is defined as follows:

$$\text{POV} = \begin{cases} 1, & \text{if the household is below the poverty line} \\ 0, & \text{otherwise} \end{cases}$$

Using the estimates of the equivalence scale parameters $(\theta_{ds},\phi)$, the poverty line was constructed as follows. Following Dreze and Srinivasan (1997, p. 225), the poverty line taking account of household size economies and adult/child related by multiplying the per capita poverty line figure (OPL) reported in Carter and May (1999) by $\left(\bar{n}_a + \sum_{s=1}^{2}\sum_{d=1}^{2} \theta_{ds}\bar{n}_{ds}\right)^{1-\phi}$, where $\bar{n}_a$ is the average number of adults, and $\bar{n}_{ds}$ is the average number of children in age group $d(d = 1,2)$ and child gender $s(s = 1,2)$. Let us define scale and composition adjusted per capita income (say $y^*$) for a household with $n_a$ adults and $n_{ds}$ children as:

$$y^* = Y \Big/ \left(n_a + \sum_{s=1}^{2}\sum_{d=1}^{2} \theta_{ds} n_{ds}\right)^{\phi}$$

where $Y$ is total household income, and the demographic parameters $(\theta_{ds},\phi)$ are fixed at their estimated values. A household is considered 'poor' if $y^* \leq \text{OPL}^* = \text{OPL}^*\left(\bar{n}_a +\right.$

Table 2
Demographic parameter estimates[a] under alternative treatment of economies of household size

| Parameter[b] | No size economies | Size economies |
|---|---|---|
| $\theta_{11}$ | 0.492 (0.073) | 0.939 (0.133) |
| $\theta_{12}$ | 0.573 (0.044) | 1.126 (0.089) |
| $\theta_{21}$ | 0.543 (0.077) | 1.091 (0.134) |
| $\theta_{22}$ | 0.690 (0.047) | 1.344 (0.107) |
| $\phi$ | 1.0 (–) | 0.656 (0.016) |

[a] Standard errors in parenthesis.

[b] $\theta_{ij}$ refers to a child of gender $i$ (1 denotes boy, 2 denotes girl) in age group $j$ (1 denotes age group 0–4 years and 2 denotes age group 5–17 years).

Table 3
Selected descriptive statistics

| Variable | Household categories | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Budget share of: | A | B | C | Difference[a] | D | E | Difference[b] | F | G | Difference[c] |
| Share 1: Food | 0.247 | 0.272 | 0.177 | 22.01* | 0.29 | 0.236 | 11.70* | 0.321 | 0.23 | 19.00* |
| Share 2: Alcohol and tobacco | 0.039 | 0.044 | 0.025 | 11.21* | 0.029 | 0.042 | − 7.34* | 0.035 | 0.04 | − 2.34* |
| Share 3: Entertainment | 0.004 | 0.003 | 0.007 | − 13.96* | 0.002 | 0.004 | − 6.60* | 0.002 | 0.004 | − 5.78* |
| Share 4: Health | 0.082 | 0.067 | 0.126 | − 18.86* | 0.083 | 0.082 | 0.19 | 0.085 | 0.082 | 0.90 |
| Share 5: Education | 0.166 | 0.178 | 0.132 | 9.13* | 0.223 | 0.15 | 13.60* | 0.194 | 0.159 | 6.28* |
| Share 6: Fuel | 0.072 | 0.07 | 0.077 | − 3.55* | 0.081 | 0.069 | 6.28* | 0.09 | 0.067 | 10.96* |
| Share 7: Clothing | 0.048 | 0.052 | 0.036 | 13.33* | 0.049 | 0.047 | 1.57 | 0.043 | 0.049 | − 4.60* |
| Share 8: Child-care | 0.005 | 0.006 | 0.004 | 2.93* | 0.005 | 0.006 | − 1.62 | 0.003 | 0.006 | − 4.34* |
| Share 9: Food eaten outside home | 0.011 | 0.011 | 0.009 | 2.48* | 0.011 | 0.011 | − 0.17 | 0.009 | 0.011 | − 2.28* |
| Share 10: Private transfer sent | 0.035 | 0.044 | 0.007 | 13.68* | 0.009 | 0.042 | − 11.44* | 0.007 | 0.041 | − 11.42* |
| Share 11: Other items | 0.291 | 0.253 | 0.4 | − 32.96* | 0.218 | 0.311 | − 18.84* | 0.211 | 0.311 | − 19.47* |
| No of Girls Aged 0–4 | 0.25 | 0.29 | 0.14 | | 0.37 | 0.22 | | 0.35 | 0.23 | |
| No. of girls aged 5–17 | 0.75 | 0.85 | 0.48 | | 1.16 | 0.64 | | 0.98 | 0.7 | |
| No. of boys aged 0–4 | 0.25 | 0.3 | 0.13 | | 0.4 | 0.21 | | 0.33 | 0.24 | |
| No. of boys aged 5–17 | 0.76 | 0.84 | 0.5 | | 1.13 | 0.65 | | 1.03 | 0.69 | |
| No. of adult females[d] | 1.35 | 1.41 | 1.16 | | 1.84 | 1.21 | | 1.52 | 1.3 | |
| No. of adult males[e] | 1.28 | 1.34 | 1.12 | | 1.52 | 1.22 | | 1.38 | 1.26 | |
| No. of elderly females[f] | 0.21 | 0.23 | 0.17 | | 0.27 | 0.19 | | 0.81 | 0.06 | |
| No. of elderly males[g] | 0.09 | 0.1 | 0.09 | | 0.1 | 0.09 | | 0.33 | 0.04 | |
| No. of children[h] | 2.01 | 2.28 | 1.26 | | 3.06 | 1.72 | | 2.69 | 1.85 | |
| No. of elderly[i] | 0.3 | 0.32 | 0.26 | | 0.37 | 0.28 | | 1.14 | 0.1 | |
| No. of adults[j] | 2.63 | 2.75 | 2.28 | | 3.36 | 2.43 | | 2.9 | 2.57 | |
| Adult equivalent household size[k] | 2.83 | 2.98 | 2.41 | 18.06* | 3.57 | 2.63 | 28.45* | 3.51 | 2.67 | 24.33* |
| Adult equivalent household size[l] | 4.14 | 4.44 | 3.29 | 18.05* | 5.57 | 3.75 | 27.60* | 5.76 | 3.77 | 27.48* |
| Household size | 4.95 | 5.36 | 3.79 | 19.38* | 6.79 | 4.44 | 28.27* | 6.73 | 4.52 | 25.44* |
| Monthly income (Rand) per equivalent adult[m] | 910.89 | 422.05 | 2282.51 | − 42.43* | 292.66 | 1082.32 | − 15.52* | 413.34 | 1031.61 | 11.57* |
| No. of households | 8398 | 6212 | 2186 | | 1835 | 6563 | | 1639 | 6759 | |

$\sum_{d=1}^{2}\sum_{s=1}^{2}\theta_{ds}\bar{n}_{ds}\big)^{1-\phi}$, where OPL is fixed at R 237 per month. Notice that if $\phi=1$ (i.e., there are no household size economies), then OPL* = OPL = R 237.

One of the explanatory variables in the budget shares is the poverty status of the household (POV). This specification reflects the view that changing economic affluence of a household has two effects on budget share: (i) a continuous, incremental effect through the three resource variables, as reflected in their estimated coefficients, and (ii) a one off, discrete effect, measured by the poverty coefficient, when the household crosses the poverty line. Evidence in support of (ii) was obtained from estimation of Engel equations for Food, in budget share form, separately for the poor and the non-poor. The results are not presented here due to space constraints but will be made available on request. They show that, in case of several items, a significant shift in preferences occurs when the household crosses the poverty line. For example, the Engel implication of a statistically significant, negative coefficient of the income variable in the Food share equation is supported only in case of the non-poor, not for the poor. Again, male-headed households, below the poverty line, have significantly lower Food share than female-headed households, a result that is consistent with the evidence in Handa (1996) and Ray (2000). However, that this observation can be seriously misleading is evident from the fact that, on pooling the observations from the poor and non-poor households, while allowing for their heterogeneity through the 'poverty variable' and its interactions, the female-headed households are found to have, ceteris paribus, significantly *lower* food share than the male-headed households.

## 3. Data and descriptive statistics

The data set used in this paper is from the South African Integrated Household Survey. The survey was conducted jointly by the World Bank and the South Africa Labour and Development Research Unit (SALDRU) at the University of Cape Town, as a part of the

Notes to Table 3:

*·: Denotes significance at 5% level.

Household Category: (A) All Households, (B) Black Households, (C) Non-Black Households, (D) Households Receiving Private Transfer, (E) Households Not Receiving Private Transfer, (F) Households Receiving Public Pension, (G) Households Not Receiving Public Pension.

[a] *t*-test for difference between Black and Non-Black households.

[b] *t*-test for difference between households that receive private transfers and households that do not.

[c] *t*-test for difference between households that receive public pensions and households that do not.

[d] Females aged 18–60.

[e] Males aged 18–65.

[f] Females aged above 60.

[g] Males aged above 65.

[h] All members aged below 18.

[i] Females aged above 60 and males aged above 65.

[j] Females aged 18–60 and males aged 18–65.

[k] Corresponding to $\phi=0.65$.

[l] Corresponding to $\phi=1.00$.

[m] Corresponding to $\phi=0.65$

* Significant using the 95% confidence interval.

Living Standard Measurement Study (LSMS) in a number of developing countries. The survey was conducted in the 9 months preceding the historic 1994 elections. The main instrument used in this survey was a comprehensive household questionnaire covering a wide range of topics. The data set is unique because it is the first survey that covers the entire South African population, including those in the Black "homelands". The complete sample consists of 8848 households drawn randomly from 360 clusters. The questionnaire and summary statistics are contained in SALDRU (1994).

For the purposes of this paper we omit households where the head is aged 17 years or less. We also ignore households with zero or negative income (where income is defined inclusive of transfers and pensions) giving us a sample of 8398 households, of whom 6256 (73.67%) are Black, 668 (7.87%) are Coloured, 245 (2.89%) are Indian and 1323 (15.58%) are Whites. The Coloureds, Indians and Whites are combined to form a category called the Non-Blacks and the Blacks, Coloureds and Indians are combined to form a category called the Non-Whites.

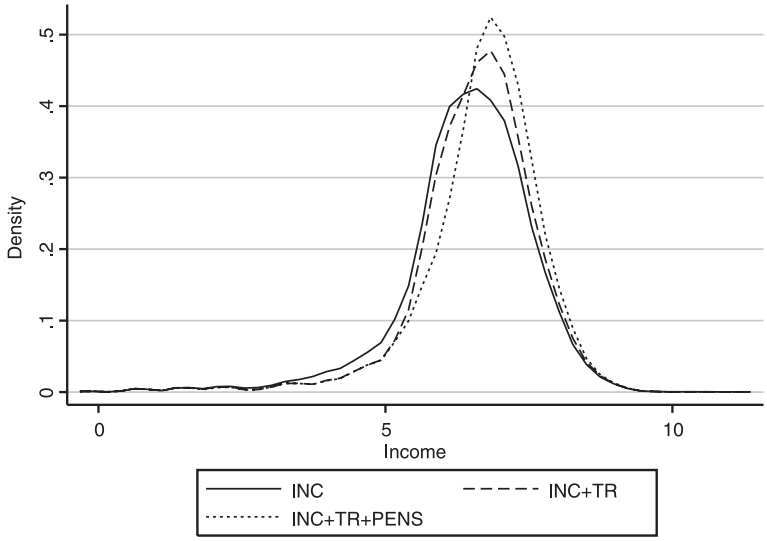
Total household expenditure is obtained as a sum of expenditure on the 11 expenditure groups mentioned earlier. While for most items, households were specifically asked about their expenses for the last 30 days, there are certain items, notably Education, for which households were asked about the expenditure over the past year. In the latter case, the monthly expenditure was obtained as the average for the past 12 months.

Table 2 presents the demographic parameter estimates of $(\theta_{ds},\phi)$ in the presence and absence of household size economies based on initial estimation of the five-item budget share system, as described earlier—see Ray (2000). The estimates are well determined and the presence of household size economies is established by rejecting the null hypothesis of $H_0$: $\phi = 1$. Henceforth we will restrict our discussion of the results to those corresponding to $\phi = 0.656$. The descriptive statistics and estimates corresponding to $\phi = 1$ are presented in Maitra and Ray (1999).

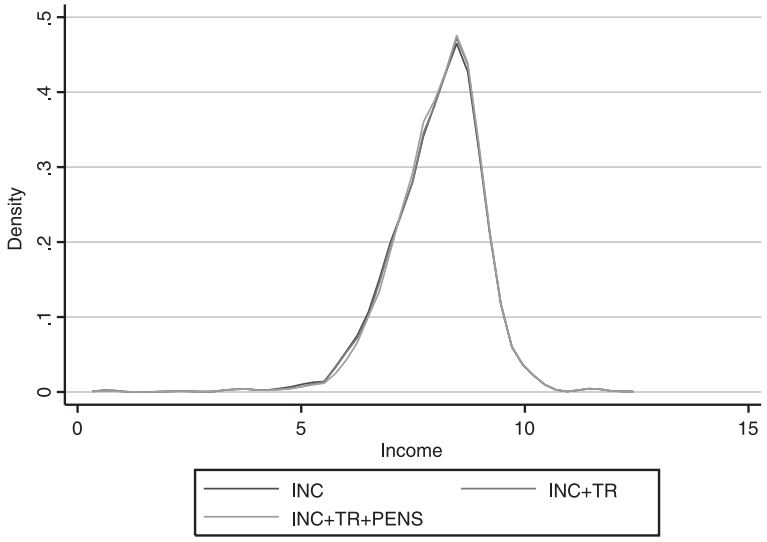
Table 3 presents the average expenditure share for the 11 commodity groups that we consider. Household category A includes "All households", household category B includes "Black households" and household category C includes "Non-Black households". We also present the estimated t-values for the difference in the average budget shares between the Black and the Non-Black households. Notice that the average expenditure shares of food, alcohol and tobacco, education, clothing, child-care, food eaten outside home and private transfer sent are significantly higher for the Black households compared to the Non-Black households. On the other hand the expenditure shares of entertainment, health, fuel and other items are higher for the Non-Black households compared to the Black households. Leaving aside the category of "other items", for both Black and Non-Black households the largest share of the budget is spent on food and education.

The households are also classified in terms of whether the household receives private transfers or not (household categories D and E, respectively) and whether the household receives social pension (public transfers) or not (household categories F and G, respectively). We also present *t*-test for the difference in the average budget shares between household categories D and E and between household categories F and G. Households that receive private transfers have higher budget shares for food, education and fuel and lower budget shares for alcohol and tobacco, entertainment, private transfer sent and other items

and households that receive public pension have higher budget shares for food, education and clothing and lower budget shares for alcohol and tobacco, entertainment, child-care, food eaten outside home, private transfer sent and other items.




**Panel A: Black Households**




**Panel B: Non Black Households**

Fig. 1. Kernel density estimates of household income with and without transfers and pensions $\phi = 0.65$.

Table 4
Impact of transfer and pension on poverty disregarding distribution sensitivity; proportion of households classified as poor ($\phi = 0.656$)

| Household category | Income excluding transfer and pension | Income including transfer and pension | Difference[a] |
|---|---|---|---|
| All households | 53.10 (4459) | 46.34 (3892) | 8.75* |
| Black households | 67.02 (4163) | 58.47 (3632) | 9.85* |
| Non-Black households | 13.54 (296) | 11.89 (260) | 1.64** |

Figures in parenthesis indicate the number of households below the poverty line.
[a] *t*-test for the difference in proportion below the poverty line.
* Significant using the 95% confidence interval.
** Significant using the 90% confidence interval.

More than 92% of all households that receive transfers are Blacks, while only 68% of all households that do not receive transfers are Blacks. More than 27% of all Black households receive transfers—significantly greater than the 6.63% of all Non-Black households. A test of the equality of proportion of households receiving transfers between Black and Non-Black households is rejected at the 99% level of significance (*p*-value of 0.00). More than 84% of households that receive private transfers are poor, and more than 77% of all households that receive public pension are poor.

Fig. 1 presents the kernel density estimates of the log of household income with and without public and private transfers received for the Black and the Non-Black households, in the presence of household economies of scale. We present kernel density estimates of the following: log(INC), log(INC + TR), log(INC + TR + PE). For the Black households, the effect of private transfers and public pensions is to shift the mass of the distribution to the right. There is no significant effect of transfers and pensions in case of the Non-Black households.

Table 4 provides evidence on the poverty rates of the various household groups. The poverty rate for the entire population is around 53% and this figure is fairly close to the World Bank estimates of the poverty rate for South Africa in 1993 (50.2%). Notwithstanding its status as an upper-middle income level country, the poverty rate for South Africa is similar to those obtained in other less developed countries (see Lancaster et al., 1999). Further, the poverty rates are significantly higher for the Black households (− 67.02%), compared to the Non-Black households (13.54%). We also find that the incidence of poverty is significantly affected by the presence or absence of economies of scale within the household. For example, when there are household economies of scale, the incidence of poverty exceeds 53%, while in the absence of household economies of scale, the poverty rate goes down to around 45%.[6]

Table 4 also presents some descriptive statistics of the effect of pensions and transfers on poverty. While the poverty rate, defined for income net of transfers and pensions, is 53.1%, it goes down to 46.34% for income defined inclusive of transfers and pensions.

[6] See Maitra and Ray (1999) for details. Our results are consistent with recent evidence on the sensitivity of poverty estimates to household economies of scale (see Buhmann et al., 1988; Blackburn, 1998; Dreze and Srinivasan, 1997; Lancaster et al., 1999; Ray, 2000).

Table 5
Panel A: income, pension and transfer equations ($\phi = 0.65$)

| Income | | Pension | | Transfer | |
|---|---|---|---|---|---|
| Variable | Coefficient | Variable | Coefficient | Variable | Coefficient |
| Number of children | − 80.223* | *Y* | − 0.00023 | *Y* | − 0.00095 |
| | (− 7.89) | | (− 0.52) | | (− 1.31) |
| Number of adults | − 74.755* | PENS_H | 149.33* | *P* | 0.015889 |
| | (− 5.52) | | (58.26) | | (0.84) |
| Number of elderly | − 23.115 | Number of | − 4.5823* | Number of | − 2.0807* |
| | (− 0.51) | children | (− 11.82) | children | (− 3.16) |
| AGEHEAD | 10.799 | Number of | − 6.5591* | Number of | 2.0857* |
| | (1.39) | adults | (− 13.98) | adults | (2.74) |
| AGE2HEAD | − 0.1078 | Number of | 8.9187* | Number of | − 2.0212 |
| | (− 1.37) | elderly | (4.61) | elderly | (− 0.69) |
| SEXHEAD | 110.24* | AGEHEAD | 0.2498 | AGEHEAD | − 1.8129* |
| | (2.64) | | (0.85) | | (− 3.84) |
| PRIMSCH | − 54.164 | AGE2HEAD | 0.003423 | AGE2HEAD | 0.015241* |
| | (− 1.07) | | (1.13) | | (3.16) |
| PRIMPLUS | − 202.01* | SEXHEAD | 11.722* | SEXHEAD | − 12.475* |
| | (− 3.25) | | (7.39) | | (− 4.95) |
| SECONDAR | 30.692 | PRIMSCH | 1.8574 | PRIMSCH | 3.9477 |
| | (0.38) | | (0.98) | | (1.30) |
| RURAL | 205.43* | PRIMPLUS | 3.2293 | PRIMPLUS | 7.9435* |
| | (3.84) | | (1.50) | | (2.25) |
| BLACK | 41.811 | SECONDAR | 4.1621 | SECONDAR | 5.4263 |
| | (0.27) | | (1.61) | | (1.27) |
| COLOURED | − 764.82* | RURAL | 0.86885 | RURAL | 1.155 |
| | (− 7.38) | | (0.44) | | (0.34) |
| INDIAN | − 696.79* | BLACK | − 4.086 | CAPE | − 0.88026 |
| | (− 5.22) | | (− 1.50) | | (− 0.21) |
| CAR | 414.14* | COLOURED | 3.1057 | BLACK | − 21.646* |
| | (12.26) | | (0.87) | | (− 4.93) |
| RADIO | 73.225* | INDIAN | 3.7979 | COLOURED | − 15.154* |
| | (3.15) | | (0.76) | | (− 2.64) |
| FRIDGE | 308.76* | CONSTANT | − 5.8472 | INDIAN | − 16.03* |
| | (7.97) | | (− 0.77) | | (− 2.00) |
| STOVE | 126.53* | | | DUNEMP | 16.062* |
| | (3.55) | | | | (4.75) |
| MAXED | 142.62* | | | DSICK | − 3.5307 |
| | (11.47) | | | | (− 0.88) |
| INT7 | − 106.79* | | | DPREG | − 3.85 |
| | (− 7.86) | | | | (− 0.77) |
| CONSTANT | 50.739 (0.22) | | | WSOURCE | 1.32* (2.28) |
| | | | | TOILETC | 0.55 (0.62) |
| | | | | POV | 4.46 (1.00) |
| | | | | INT5 | − 0.11* |
| | | | | | (− 4.25) |
| | | | | INT6 | 0.03* (2.30) |
| | | | | CONSTANT | 63.82* |
| | | | | | (5.23) |

*(continued on next page)*

Table 5 (*continued*)

| 3SLS Estimates ($\phi = 0.65$), Panel B: budget share equations | | | | | |
|---|---|---|---|---|---|
| Variable | SHARE1 | SHARE2 | SHARE3 | SHARE4 | SHARE5 |
| POV | 1.33e − 01* | 4.55e − 03 | − 7.00e − 04 | 8.58e − 03 | 4.87e − 02** |
| | (12.9) | (1.1) | ( − 0.8) | (1.2) | (1.8) |
| *R* | 2.66e − 03* | − 3.18e − 04 | − 2.08e − 04* | 4.71e − 04 | 9.98e − 03* |
| | (3.5) | ( − 1.1) | ( − 3.1) | (0.9) | (5.0) |
| *P* | 1.73e − 04 | − 4.25e − 05 | 1.77e − 05 | − 2.05e − 04** | 4.91e − 04 |
| | (1.1) | ( − 0.7) | (1.3) | ( − 1.9) | (1.2) |
| *Y* | − 3.42e − 05* | − 1.48e − 05* | 1.75e − 06* | 2.68e − 06 | 2.26e − 05 |
| | ( − 4.9) | ( − 5.4) | (2.9) | (0.5) | (1.3) |
| INT1 | − 1.61e − 03* | 1.39e − 04 | 1.20e − 04* | − 1.64e − 04 | − 5.56e − 03* |
| | ( − 2.9) | (0.7) | (2.5) | ( − 0.4) | ( − 3.9) |
| INT2 | 5.26e − 05 | 3.35e − 05 | − 1.23e − 06 | 5.34e − 05 | − 3.95e − 04 |
| | (0.5) | (0.8) | ( − 0.1) | (0.7) | ( − 1.4) |
| INT3 | − 3.26e − 06 | 8.94e − 07 | 3.17e − 07 | − 2.42e − 06 | − 1.50e − 05 |
| | ( − 0.6) | (0.4) | (0.6) | ( − 0.6) | ( − 1.0) |
| INT4 | − 7.00e − 04* | − 4.46e − 05 | 4.94e − 05* | − 1.77e − 04 | − 2.46e − 03* |
| | ( − 2.8) | ( − 0.5) | (2.3) | ( − 1.0) | ( − 3.8) |
| INT5 | 6.60e − 05 | − 4.11e − 05** | − 9.47e − 06** | 6.43e − 05 | 3.03e − 04** |
| | (1.1) | ( − 1.7) | ( − 1.7) | (1.5) | (1.8) |
| INT6 | − 2.41e − 04* | 2.46e − 05* | 1.63e − 06 | − 1.27e − 05 | − 1.07e − 04 |
| | ( − 8.8) | (2.3) | (0.7) | ( − 0.7) | ( − 1.5) |
| RSQ | − 4.92e − 07* | 4.93e − 08 | 3.70e − 08* | − 7.54e − 08 | − 1.77e − 06* |
| | ( − 2.9) | (0.7) | (2.5) | ( − 0.6) | ( − 4.0) |
| PSQ | − 6.80e − 08 | 2.58e − 08 | − 6.17e − 09 | 9.21e − 08 | − 2.76e − 07 |
| | ( − 0.8) | (0.8) | ( − 0.8) | (1.5) | ( − 1.3) |
| YSQ | 5.10e − 10* | 2.39e − 10* | − 3.33e − 11* | − 6.41e − 11 | − 3.98e − 10 |
| | (3.5) | (4.2) | ( − 2.6) | ( − 0.6) | ( − 1.1) |
| Number of children | − 8.01e − 03* | − 6.12e − 03* | − 1.73e − 04 | − 1.84e − 03* | 3.32e − 02* |
| | ( − 6.4) | ( − 12.8) | ( − 1.6) | ( − 2.1) | (10.0) |
| Number of adults | − 1.03e − 02* | 1.15e − 03* | 5.89e − 04* | − 2.33e − 03* | 1.00e − 02* |
| | ( − 7.0) | (2.0) | (4.6) | ( − 2.3) | (2.5) |
| Number of elderly | 3.60e − 03 | 1.09e − 03 | − 1.22e − 03* | 2.49e − 02* | − 2.31e − 02 |
| | (0.6) | (0.5) | ( − 2.3) | (5.8) | ( − 1.4) |
| AGEHEAD | 2.17e − 03* | − 1.82e − 04 | − 6.89e − 04* | 1.16e − 03** | 1.03e − 02* |
| | (2.4) | ( − 0.5) | ( − 9.0) | (1.9) | (4.3) |
| AGE2HEAD | − 1.97e − 05* | 8.21e − 07 | 5.72e − 06* | − 7.57e − 06 | − 8.79e − 05* |
| | ( − 2.2) | (0.2) | (7.3) | ( − 1.2) | ( − 3.6) |
| SEXHEAD | 1.71e − 02* | 2.07e − 02* | − 1.72e − 03* | 4.78e − 03 | 4.28e − 02* |
| | (2.6) | (8.2) | ( − 3.0) | (1.0) | (2.5) |
| PRIMSCH | − 1.38e − 02* | − 8.05e − 03* | − 8.43e − 04** | 4.44e − 03 | − 9.48e − 04 |
| | ( − 2.4) | ( − 3.6) | ( − 1.7) | (1.1) | ( − 0.1) |
| PRIMPLUS | − 4.08e − 02* | − 1.44e − 02* | 4.84e − 04 | 2.94e − 03 | 2.86e − 03 |
| | ( − 6.1) | ( − 5.6) | (0.8) | (0.6) | (0.2) |
| SECONDAR | − 2.85e − 02* | − 1.87e − 02* | − 4.01e − 05 | − 4.29e − 03 | 6.46e − 02* |
| | ( − 3.3) | ( − 5.6) | ( − 0.1) | ( − 0.7) | (2.8) |
| RURAL | 3.09e − 02* | 8.78e − 03* | − 1.72e − 03* | 1.51e − 02* | − 9.60e − 03 |
| | (5.1) | (3.8) | ( − 3.3) | (3.6) | ( − 0.6) |
| BLACK | 1.04e − 02 | − 9.13e − 03 | − 3.66e − 03** | − 9.30e − 02* | 1.84e − 01* |
| | (0.5) | ( − 1.0) | ( − 1.9) | ( − 5.9) | (3.2) |

| SHARE6 | SHARE7 | SHARE8 | SHARE9 | SHARE10 | SHARE11 |
|---|---|---|---|---|---|
| 4.80e − 02* | − 2.02e − 02* | − 7.38e − 03* | − 4.21e − 03** | − 6.94e − 02* | − 1.41e − 01* |
| (11.7) | (− 6.8) | (− 4.7) | (− 1.9) | (− 5.3) | (− 7.3) |
| 3.00e − 04 | − 4.97e − 04* | − 2.79e − 04* | − 2.28e − 04 | − 4.74e − 03* | − 7.14e − 03* |
| (1.0) | (− 2.2) | (− 2.4) | (− 1.3) | (− 4.9) | (− 5.0) |
| − 1.39e − 05 | 1.85e − 05 | − 1.69e − 05 | − 1.16e − 05 | − 2.69e − 04 | − 1.42e − 04 |
| (− 0.2) | (0.4) | (− 0.7) | (− 0.3) | (− 1.4) | (− 0.5) |
| − 2.42e − 05* | 3.02e − 07 | 1.23e − 06 | 3.91e − 06* | 3.85e − 07 | 4.03e − 05* |
| (− 8.6) | (0.1) | (1.1) | (2.5) | (0.0) | (3.2) |
| − 2.03e − 04 | 2.95e − 04** | 1.70e − 04* | 1.36e − 04 | 2.60e − 03* | 4.07e − 03* |
| (− 0.9) | (1.9) | (2.0) | (1.1) | (3.8) | (4.0) |
| 3.88e − 05 | − 2.16e − 05 | 1.22e − 06 | 3.01e − 05 | 6.48e − 05 | 1.43e − 04 |
| (0.9) | (− 0.7) | (0.1) | (1.2) | (0.5) | (0.7) |
| 7.19e − 06* | − 9.74e − 07 | − 8.08e − 07 | − 9.62e − 07 | 2.31e − 05* | − 8.11e − 06 |
| (3.0) | (− 0.6) | (− 0.9) | (− 0.7) | (3.2) | (− 0.8) |
| − 8.22e − 05 | 1.51e − 04* | 6.79e − 05** | 7.16e − 05 | 1.27e − 03* | 1.86e − 03* |
| (− 0.8) | (2.1) | (1.8) | (1.3) | (4.0) | (4.0) |
| − 1.01e − 05 | − 3.48e − 05** | 9.13e − 06 | − 2.95e − 05* | 1.68e − 05 | − 3.34e − 04* |
| (− 0.4) | (− 1.9) | (0.9) | (− 2.1) | (0.2) | (− 2.9) |
| − 9.98e − 05* | 4.61e − 05* | 5.51e − 06 | 5.93e − 06 | 7.22e − 05* | 3.05e − 04* |
| (− 9.2) | (5.8) | (1.3) | (1.0) | (2.0) | (5.8) |
| − 6.07e − 08 | 8.95e − 08** | 5.01e − 08** | 4.10e − 08 | 8.44e − 07* | 1.29e − 06* |
| (− 0.9) | (1.8) | (1.9) | (1.1) | (4.0) | (4.1) |
| 1.61e − 08 | − 5.58e − 09 | 7.85e − 09 | 1.07e − 09 | 1.43e − 07 | 6.99e − 08 |
| (0.5) | (− 0.2) | (0.6) | (0.1) | (1.4) | (0.5) |
| 4.07e − 10* | − 1.02e − 11 | − 1.88e − 11 | − 7.33e − 11* | 2.82e − 11 | − 5.86e − 10* |
| (6.9) | (− 0.2) | (− 0.8) | (− 2.2) | (0.2) | (− 2.2) |
| − 5.74e − 03* | 1.23e − 04 | 7.21e − 04* | − 2.22e − 04 | − 6.70e − 03* | − 5.20e − 03* |
| (− 11.7) | (0.3) | (3.8) | (− 0.8) | (− 4.2) | (− 2.2) |
| − 2.02e − 03* | 4.13e − 05 | − 1.57e − 04 | − 1.05e − 03* | − 2.55e − 03 | 6.62e − 03* |
| (− 3.5) | (0.1) | (− 0.7) | (− 3.2) | (− 1.4) | (2.4) |
| 5.89e − 03* | − 1.42e − 03 | 1.81e − 05 | − 1.21e − 03 | − 4.04e − 03 | − 4.46e − 03 |
| (2.4) | (− 0.8) | (0.0) | (− 0.9) | (− 0.5) | (− 0.4) |
| 1.38e − 03* | − 1.33e − 03* | − 5.15e − 04* | − 5.34e − 05 | − 3.68e − 03* | − 8.57e − 03* |
| (3.9) | (− 5.2) | (− 3.8) | (− 0.3) | (− 3.2) | (− 5.1) |
| − 7.78e − 06* | 1.06e − 05* | 3.74e − 06* | 5.56e − 07 | 3.02e − 05* | 7.13e − 05* |
| (− 2.2) | (4.1) | (2.7) | (0.3) | (2.6) | (4.1) |
| 4.37e − 03** | − 6.37e − 03* | − 3.72e − 03* | − 3.32e − 04 | − 2.59e − 02* | − 5.16e − 02* |
| (1.7) | (− 3.4) | (− 3.7) | (− 0.2) | (− 3.1) | (− 4.2) |
| 3.22e − 03 | 2.18e − 03 | 3.76e − 04 | − 1.18e − 03 | 6.99e − 03 | 7.58e − 03 |
| (1.4) | (1.3) | (0.4) | (− 0.9) | (0.9) | (0.7) |
| 2.33e − 03 | 4.07e − 03* | 2.62e − 04 | − 2.67e − 03** | 2.59e − 03 | 4.23e − 02* |
| (0.9) | (2.1) | (0.3) | (− 1.8) | (0.3) | (3.3) |
| 1.11e − 02* | − 1.06e − 03 | − 3.77e − 03* | − 3.06e − 03 | − 3.63e − 02* | 2.01e − 02 |
| (3.2) | (− 0.4) | (− 2.8) | (− 1.6) | (− 3.2) | (1.2) |
| − 1.99e − 02* | 5.95e − 03* | 3.47e − 03* | − 1.41e − 03 | 1.16e − 02 | − 4.31e − 02* |
| (− 8.4) | (3.5) | (3.8) | (− 1.1) | (1.5) | (− 3.8) |
| − 6.26e − 02* | 3.03e − 02* | 3.15e − 03 | 7.07e − 03 | 5.08e − 03 | − 7.20e − 02** |
| (− 6.9) | (4.7) | (0.9) | (1.4) | (0.2) | (− 1.8) |

*(continued on next page)*

Table 5 (*continued*)

| 3SLS Estimates ($\phi = 0.65$), Panel B: budget share equations | | | | | |
|---|---|---|---|---|---|
| Variable | SHARE1 | SHARE2 | SHARE3 | SHARE4 | SHARE5 |
| COLOURED | 2.01e − 02 | − 1.16e − 02** | − 4.23e − 04 | − 6.60e − 02* | 8.95e − 03 |
| | (1.3) | ( − 1.9) | ( − 0.3) | ( − 6.1) | (0.2) |
| INDIAN | − 7.04e − 02* | − 1.92e − 02* | 3.10e − 04 | 1.10e − 02 | 4.10e − 02 |
| | ( − 3.8) | ( − 2.7) | (0.2) | (0.9) | (0.9) |
| CONSTANT | 1.44e − 01* | 7.78e − 02* | 2.63e − 02* | 1.09e − 01* | − 4.57e − 01* |
| | (4.2) | (5.8) | (8.8) | (4.5) | ( − 5.1) |

Figures in parenthesis indicate *t*-ratios.
The regressions control for the pre-1994 province of residence. Reference province: Transvaal.
INT1 = *R*∗BLACK; INT2 = *P*∗BLACK; INT3 = *Y*∗BLACK; INT4 = *R*∗POV; INT5 = *P*∗POV; INT6 = *Y*∗POV; INT7 = MAXED∗BLACK.
SHARE1 = Food; SHARE2 = Alcohol and tobacco; SHARE3 = Entertainment; SHARE4 = Health; SHARE5 = -Education; SHARE6 = Fuel; SHARE7 = Clothing; SHARE8 = Child-care; SHARE9 = Food eaten outside home; SHARE10 = Transfer sent; SHARE11 = Other items.
* Significant using the 95% confidence interval.
** Significant using the 90% confidence interval.

Separately calculated for Black and Non-Black households, the corresponding poverty rates decline from 67.02% to 58.47% and from 13.54% to 11.87%, respectively. Let us define $p_0$ as the proportion of households below the poverty line, when household income is defined net of transfer and pension received and $p_1$ as the proportion of households below the poverty line, when household income is defined inclusive of transfer and pension received. A *t*-test for equality of proportions ($H_0$: $p_0 = p_1$) against the alternative ($H_0$: $p_0 > p_1$) is rejected in all cases. The qualitative properties of the results are the same if we assume that there are no economies of scale within the household ($\phi = 1$) or take into account the distribution of income below the poverty line, by using the poverty index due to Foster et al. (1984). However, while it is the case that transfers help reduce the incidence of poverty, they are also targeted to households that lie below the poverty line. For example, more than 34% of households that lie below the poverty line receive private transfers compared to only 7.24% of households that lie above the poverty line. Likewise, more than 28% of poor households receive public pension compared to 11% of non-poor households.

## 4. Results

Table 5 presents the 3SLS estimates of the 13-equation system of equations, consisting of the three resource inflow equations and the 10 'free' budget share equations. The estimates for the omitted category were obtained using the adding up condition.

Using a standard Lagrange Multiplier test (see Breusch and Pagan, 1980) we reject the null hypothesis of a diagonal covariance matrix of the disturbances. This justifies the use of the 3SLS technique. Using the Wu–Hausman test, the exogeneity of the three resource flow variables in the budget share equations is rejected. We also reject the exogeneity of household income in the "pension received" equation and the exogeneity of household

| SHARE6 | SHARE7 | SHARE8 | SHARE9 | SHARE10 | SHARE11 |
|---|---|---|---|---|---|
| − 7.84e − 03 | 2.72e − 02* | 4.11e − 03** | 4.28e − 03 | 9.29e − 04 | 2.03e − 02 |
| ( − 1.3) | (6.1) | (1.7) | (1.3) | (0.0) | (0.7) |
| − 1.90e − 02* | 1.98e − 02* | − 3.39e − 04 | 4.37e − 03 | − 7.15e − 03 | 3.95e − 02 |
| ( − 2.6) | (3.8) | ( − 0.1) | (1.1) | ( − 0.3) | (1.2) |
| 7.44e − 02* | 7.49e − 02* | 2.68e − 02* | 1.52e − 02* | 2.36e − 01* | 6.73e − 01* |
| (5.4) | (7.5) | (5.1) | (2.0) | (5.5) | (10.5) |

income and pension received in the ‘‘private transfer received’’ equation. All of these point to the need to treat the resource flow variables as jointly endogenous in the estimation procedure as done here.

Let us first examine the 3SLS estimates of the three-resource flow variables ( *Y*, *P* and *R*). These results are presented in Table 5, Panel A. There is an inverse association between income per equivalent adult, and the number of household members (both adults and children). In contrast, the number of elderly in the household has little impact on the income earning capacity of the household. Of the other independent variables in the income equation, the ones of interest are the highest level of education attained by any member of the household, the race variables and the gender of the household head. Increasing education does enhance the income earning capacity of the household—the coefficient of MAXED is positive and significant, though the (significantly) negative estimate of the interaction term, INT7(MAXED∗BLACK), suggests that the positive impact of education on income is considerably weakened for the Black households. This possibly reflects the legacy of apartheid, which severely constrained the income earning capacity of the Black households. This is confirmed when we conduct estimation for Black households separately (results not presented here). In this case the coefficient of the MAXED variable drops from 142.62 (for all races) to 19.13 (for Blacks only). Controlling for the other variables, the Indians and the Coloured earn less than the default category of White households. Finally, our estimates show that male-headed households earn significantly more than female-headed households. The coefficient of SEXHEAD is 110.24 implying that if the two households are otherwise identical, the monthly per adult equivalent household income is higher by R 110.24 for the male-headed household.

Turning to the pensions and transfers equations, we find that there are strong demographic effects of household composition changes on these resource flows, especially on pensions. An increase in the number of elderly in the household significantly increases

the amount of pension received by the household, whereas an increase in the number of children and in the number of adults significantly decreases the amount of pension received by the household. Male-headed households receive significantly higher amount of pensions then female-headed households. Household income does not appear to have a significant impact on the amount of pension received. This implies that the number of age-qualified individuals in the household, rather than household income, determines the amount of pension received by the household. These results are fairly consistent with those obtained by Case and Deaton (1998).

Turning to the estimated public pensions and private transfers equations, we find that race matters much more the latter than for the former. In value terms, all the three Non-White races (Blacks, Coloureds and Indians) receive less private transfer than the default White community but there is no significant difference in the amount of public pension received by the different racial groups. Note, however, that the proportion of Black households that receive transfers is significantly higher than the corresponding proportion for the other races.[7] Unlike the amount of public pension received, the number of elderly in the household does not appear to have a significant impact on the amount of private transfer received by the household.

The poverty variable (POV) has a significant impact on transfers but only through the interaction terms, INT5 ($P$∗POV) and INT6 ($R$∗POV). This is consistent with the earlier observation that public pensions and private transfers help to reduce the poverty rates. Note that the SEXHEAD variable coefficient has reverse signs between the 'pensions' and 'transfers' equations. Ceteris paribus, male-headed households receive more pensions than female-headed households. In contrast, female-headed households receive more transfers compared to male-headed households. This implies that a female-headed household is generally characterised by its male breadwinner being a migrant working away from home and transferring his earnings to the rest of his household—a direct consequence of the oscillatory migrant labour system. The amount of private transfers received by the household is higher for households that have at least one unemployed adult. This implies that to a certain extent private transfers are received in response to household specific shocks.

The other result of interest is the effect of public pension received on the amount of private transfer received by the household. It is generally argued that since public pensions and private transfers perform roughly similar functions, they are substitutes and public pensions often crowd out private transfers. This is known in the literature as the "crowding out effect". There now exists a fairly large literature that examines crowding out of private transfers as a result of public programs. However, when we take into account the endogeneity of resource flows and in particular when we stop assuming that one form of transfer is exogenous when estimating the determinants of the other, there is a change in the relationship between the two forms of transfers. We no longer find any evidence of crowding out. However, when we interact the amount of pension received

[7] The probability of an average Black household receiving private transfers is 16%, which is significantly higher than the corresponding probability for an average White household (0.05%). This essentially means that while Black households generally have a higher probability of receiving transfers, the actual amount of such transfers is smaller for the Black households.

by the household with the poverty dummy (INT5 = $P$*POV), the coefficient of INT5 is always negative and significant. It therefore appears that private transfers and public pensions act as substitutes only for the poor households not for the non-poor. This has important implications for policy. Public transfers are often laid on top of pre-existing, informal systems of private transfers and support among individuals in the same family or community. Consequently, private and public transfers perform similar functions. The present South African results suggest that the public programs end up reducing the amount of private support for the poor households. Now private transfers are generally received by households from their relatives and poor households are more likely to receive transfers from households that are themselves resource constrained. Such households might find it optimal to reduce the amount of transfer they send in response to public pension received by the household. How does it affect the welfare of the poor, who are the ones in need of assistance? The poor could actually be worse off as a result of the public pensions crowding out private transfers. In contrast, the non-poor are actually better off because they now receive the public pension without a corresponding decline in private transfers. Consequently, public pensions in South Africa are likely to be inequality increasing because of their asymmetric effects between the poor and the non-poor. This raises important questions regarding the effectiveness of the targeting of the public pension programs because the public programs were designed to improve the welfare of the ones in need, particularly the poor. The results on crowding out of private transfers by public pensions for the poor but not the non-poor are actually strengthened when we allow for endogeneity of the poverty status of the household. We will come back to this issue later.

The estimated budget share equations are presented in Table 5, Panel B. We find that the poverty and income (POV and $Y$) variables are both significant for several items, most notably, Food and Fuel. In other words, changing household affluence has both a discrete (via the poverty variable) and a continuous impact (via the income variable) on the budget share of these items. The estimated coefficients have the expected signs. Ceteris paribus, 'poor' people spend more of their budget share on Food and Fuel. Again, ceteris paribus, rising household income per equivalent adult is associated with reduced share of these items in the household budget. Both are consistent with Engel's law, as indeed, is the fact that the reverse is indicated for 'Other Items', which consists mainly of luxury items.

Transfers, but not pensions, have significant impact on budget shares of several items, most notably, Food, Entertainment, Education, Clothing, Child-care and Other Items. It is important to note that in several cases private transfers and income act in reverse ways. For example, transfers increase the share of food, while income reduces it. They, also, act in opposite direction for 'other items'. Consistent with the recent literature on rank 3 demand models (see Blundell and Lewbel, 1991; Lancaster and Ray, 1998), the squares of the three resource variables have significant effects in case of several items. The impact of income and transfers on budget shares is, also, seen from the significance of the interaction terms, INT1, INT3, INT4, INT6 in several cases.

It is clear from our estimation results that income, pensions and transfers have quite different impacts on budget shares. Unlike Case and Deaton (1998), we find that transfer and non-transfer income are not spent in the same way and that the expenditure patterns

are different for households that receive transfers compared to households that do not. What explains this behaviour? There are several possible explanations. First, the total transfer received is obtained as the sum of transfer received in cash plus the cash value of the transfer received in kind. So if a large part of the transfer received is in kind, it can explain why transfers result in different expenditure patterns because transfers in kind cannot be used for "any purpose" as transfers in kind are not easily fungible. This is similar to the so-called "cash-out puzzle" in the United States, where it has been observed that the marginal propensity to consume food with respect to transfer received in the form of food coupons is higher than the corresponding marginal propensity with respect to transfers in the form of cash. Second, at least a part of the transfers are received for specific purposes. For example, the results in Panel A show that the presence of an unemployed adult in the household significantly increases the amount of transfer received by the household. One could argue that households with unemployed adults (and the households that receive transfer) are constrained in their spending ability and for such households the expenditure patterns are different. A third explanation is that it matters who receives the transfer within the household. For example, it is often the case that the transfers are received from the main breadwinner being a migrant working away from home and transferring part of his earnings to the rest of his household, in particular to his wife, who has consequently control over how the money is going to be spent. Generally therefore, characteristics of the member who controls the allocation of resources is different in households that receive transfers from that in households that do not receive transfers and this is reflected in different expenditure patterns. This argument is in line with the predictions of the non-unitary household models as discussed earlier.

One of the most significant results of this study is that the estimated coefficients of the three resource variables in the budget share equations differ markedly from one another. In other words, equality of these coefficients that the traditional unitary model implies is easily rejected by the data. This can be viewed as a rejection of the idea of income pooling underlying the traditional model. The persons within the household receiving income, receiving public pension and receiving private transfers are typically different individuals with varying preferences. This is reflected in the sensitivity of the marginal resource impact on budget share to the individual generating the additional resource.

Notice that the gender of the household head has a significant impact on several of the budget shares. Male-headed households spend less on entertainment, clothing, child-care and other items but spend more on food, education and fuel. Of the other variables, Race has an impact on some of the budget shares. For example, Indian households spend less of their budget on food while Black and Coloured households spend less of their budget on Health than the others. Non-White households spend a greater share of their budget on Clothing. The gender and the highest level of schooling attained by the household head have strong impact on the budge shares. For example, primary and secondary schooling of the household head reduce the budget shares of food. It is worth noting, however, that only the secondary education variable (SECONDAR) has a significant, positive impact on the share of education in the household budget.

The empirical results discussed above treat the poverty status of the household as an exogenous variable. As the referee correctly noted, this is inconsistent with the treatment of income as endogenous, since poverty is a function of income. This raises the issue of

sensitivity of our results to (a) the treatment of poverty as an endogenous regressor, and (b) its omission altogether as in traditional estimation. To investigate this issue, we augmented the equation system (8)–(11), by including an additional equation for the poverty status of the household, and re-estimated the new system under (a) and (b). The poverty variable was endogenised by allowing it to depend on a set of household characteristics. To save space, and to examine our results on robustness of the crowding out of private transfers by social pensions, we present in Table 6 the 3SLS estimates of the private transfers equation

Table 6
Sensitivity of the 3SLS estimates to alternative treatment of the poverty variable

| Poverty equation | | Private transfer equation | | |
|---|---|---|---|---|
| Variable | Coefficient | Variable | Endogenous poverty | Poverty omitted |
| | | | Coefficient | Coefficient |
| Number of adults | 0.01** (1.89) | *Y* | 0.000 (0.078) | − 0.001* (1.97) |
| Number of elderly | − 0.01 (0.96) | *P* | 0.045* (2.32) | − 0.033* (2.14) |
| AGEHEAD | 0.00* (2.59) | Number of children | − 3.38* (4.83) | − 1.89* (2.96) |
| SEXHEAD | − 0.11* (11.83) | Number of adults | 2.33* (3.06) | 2.23* (2.95) |
| PRIMSCH | − 0.08* (7.18) | Number of elderly | 0.09 (0.03) | − 2.04 (0.71) |
| PRIMPLUS | − 0.23* (17.64) | AGEHEAD | − 1.71* (3.65) | − 1.72* (3.68) |
| SECONDAR | − 0.35* (22.69) | AGE2HEAD | 0.02* (3.03) | 0.01* (2.94) |
| RURAL | 0.18* (18.10) | SEXHEAD | − 7.45* (2.90) | − 13.00* (5.23) |
| DUNEMP | 0.36* (31.39) | PRIMSCH | 7.18* (2.35) | 4.47 (1.49) |
| DSICK | 0.02 (1.12) | PRIMPLUS | 18.21* (4.95) | 7.93* (2.30) |
| DPREG | 0.02 (0.85) | SECONDAR | 21.22* (4.68) | 4.38 (1.06) |
| BLACK | 0.28* (18.87) | RURAL | − 2.95 (0.86) | 1.26 (0.37) |
| COLOURED | 0.13* (6.66) | BLACK | − 26.71* (6.10) | − 19.93* (4.62) |
| INDIAN | − 0.03 (0.99) | COLOURED | − 15.13* (2.65) | − 14.82* (2.62) |
| CONSTANT | 0.21* (7.46) | INDIAN | − 10.76 (1.34) | − 17.00* (2.14) |

Sensitivity of the 3SLS estimates to alternative treatment of the poverty variable (Private transfers)

| Private transfer equation | | |
|---|---|---|
| Variable | Endogenous poverty | Poverty omitted |
| | Coefficient | Coefficient |
| DUNEMP | 1.58 (0.45) | 16.63* (5.06) |
| DSICK | − 3.22 (0.80) | − 2.21 (0.56) |
| DPREG | − 3.00 (0.66) | − 3.50 (0.71) |
| WSOURCE | 0.68 (1.14) | 1.24* (2.18) |
| TOILETC | − 1.59 (1.62) | 1.02 (1.18) |
| POV | 73.21* (7.54) | – |
| INT5 | − 0.13* (5.14) | – |
| INT6 | − 0.08* (3.11) | – |
| CONSTANT | 50.96* (4.13) | 64.10* (5.27) |
| Breusch Pagan Statistic | $\chi^2_{91}$: 4079.258 | $\chi^2_{78}$: 4094.879 |

Figures in parenthesis indicate *t*-ratios.
INT5 = *P*∗POV; INT6 = *Y*∗POV.
The regressions control for the pre-1994 province of residence. Reference province: Transvaal.
* Significant using the 95% confidence interval.
** Significant using the 90% confidence interval.

Table 7
Robustness—3SLS estimates of income and transfer equations in a non-recursive framework with income dependent on pensions and transfer

| Income equation | | Private transfer equation | |
|---|---|---|---|
| Variable | Coefficient | Variable | Coefficient |
| *P* | 0.07 (0.28) | *Y* | 0.00* ( − 2.41) |
| *R* | − 0.81* ( − 4.10) | *P* | 0.04* (2.27) |
| Number of children | − 74.90* ( − 7.39) | Number of children | − 3.45* ( − 4.93) |
| Number of adults | − 79.51* ( − 5.93) | Number of adults | 2.29* (3.01) |
| Number of elderly | − 42.91 ( − 0.89) | Number of elderly | 0.00 (0.00) |
| AGEHEAD | 12.77**(1.66) | AGEHEAD | − 1.66* ( − 3.52) |
| AGE2HEAD | − 0.12 ( − 1.58) | AGE2HEAD | 0.01* (2.93) |
| SEXHEAD | 124.39* (2.99) | SEXHEAD | − 7.23* ( − 2.81) |
| PRIMSCH | − 56.20 ( − 1.12) | PRIMSCH | 7.13* (2.34) |
| PRIMPLUS | − 225.99* ( − 3.72) | PRIMPLUS | 17.92* (4.87) |
| SECONDAR | 126.78 (1.56) | SECONDAR | 22.00* (4.85) |
| RURAL | 191.80* (3.61) | RURAL | − 2.55 ( − 0.75) |
| BLACK | − 1124.23* ( − 13.69) | BLACK | − 30.35* ( − 6.93) |
| COLOURED | − 1043.45* ( − 10.41) | COLOURED | − 18.34* ( − 3.21) |
| INDIAN | − 843.30* ( − 6.35) | INDIAN | − 13.33** ( − 1.66) |
| CAR | 432.82* (13.07) | DUNEMP | 2.23 (0.64) |
| RADIO | 65.02* (2.84) | DSICK | − 3.29 ( − 0.82) |
| FRIDGE | 266.13* (6.96) | DPREG | − 3.01 ( − 0.61) |
| STOVE | 76.31* (2.17) | WSOURCE_ | 0.67 (1.13) |
| MAXED2 | 53.76* (7.27) | TOILET_C | − 1.57 ( − 1.60) |
| CONSTANT | 1079.99* (5.33) | POV | 70.77* (7.29) |
| | | INT5 | − 0.13* ( − 5.12) |
| | | INT6 | − 0.07* ( − 2.95) |
| | | CONSTANT | 54.51* (4.41) |

Figures in parenthesis indicate *t*-ratios. INT5 = *P*∗POV; INT6 = *Y*∗POV. Breusch Pagan Statistic: $\chi^2_{91}$: 4091.083. The regressions control for the pre-1994 province of residence. Reference province: Transvaal.

* Significant using the 95% confidence interval.

** Significant using the 90% confidence interval.

(Eq. (10)) under (a) and (b) and the coefficient estimates for the poverty status of the household under assumption (a).[8]

The following results emerge. First, several of the explanatory variables in the poverty equation are highly significant, and have the expected sign. This adds confidence to their use as instruments for the poverty variable in the 3SLS estimates of the private transfers equation presented on the right hand side of Table 6. It is worth noting that relative to White households, Black and Coloured households are more likely to be poor. Male-headed households are less likely to be poor as are households where the household head is educated. Second, one of the principal results of this study, namely, that public transfers crowd out private transfers for poor households but not for non-poor households, comes out quite clearly from Table 6. The estimated coefficients of pensions (*P*) and of the interaction term INT5 (*P*∗POV), which are both highly significant, have reverse signs and confirm that while the two forms of transfers are substitutes for households below the

[8] Note that the estimates for the poverty status are linear probability estimates.

poverty line, they have a complementary relationship for other households. As noted earlier, this is a result with considerable welfare significance. The other estimates seem, qualitatively, quite robust between the alternative treatments of poverty in the estimation. Third, the omission of the poverty variable does not reverse the result on crowding out of private by pubic transfer. Since we, now, do not distinguish between poor and non-poor households the crowding out of private transfers by social pensions is seen to hold for all households. Finally, once it is endogenised, the poverty variable is seen to exert a highly significant, large positive impact on private transfer. In other words, poor households receive significantly larger amount of transfer than the non-poor households.

The empirical results presented so far have been obtained using the recursive framework described by Eqs. (8)–(11). As the anonymous referee notes, a key feature of this framework is that household income, $Y$, does not depend on the other resource variables, namely, social pensions, $P$, and private transfer, $R$. Following the referee's suggestion, we examined the robustness of our results by extending Eq. (8) to allow household income, $Y$, to depend on $P$ and $R$ in addition to the other variables. For reasons of space, we report in Table 7 the 3SLS estimates of only the re-estimated household income ( $Y$) and private transfer received ($R$) equations. It is clear from Table 7 that, notwithstanding the significance in the estimated coefficient of private transfers received in the "Income" equation, the qualitative conclusions are quite robust to the specification change. In particular, the result that social pensions crowd out private transfer for the poor but complement them for the non-poor holds in the present case as well. A comparison of the 3SLS estimates of the private transfer equation in Tables 6 and 7 shows that there is very little difference between the two sets of estimates. The 3SLS estimates of the budget share equations in the non-recursive system, not reported here, tell a similar story. These suggest that the recursive framework, given by Eqs. (8)–(11), provides a useful and convenient simplification that does not distort the qualitative picture and the principal conclusions.

## 5. Conclusion

There now exists a large literature on the determinants of private and public transfers received by households. However, there is virtually no analysis of the impact of such transfers on poverty and household expenditure patterns, specially, within a complete systems framework where the possible endogeneity of such transfers is taken into account in the estimation. The principal motivation of this study has been to perform such an analysis using household level data from South Africa.

The results show that the three household resource variables, namely, income, public and private transfers, should be treated as jointly determined with the expenditure shares in the estimation. The OLS estimation of the expenditure shares equations that treats income and transfers as exogenous, besides suffering from mis-specification, are likely to yield misleading results. Before concluding, it is worth re-iterating the principal results of this paper.

1. In a departure from conventional demand analysis, we allow both a discrete effect (through a poverty dummy) and a continuous effect of changing household resources

on its expenditure pattern. We find that in case of several items, most notably Food and Fuel, both effects are significant. With respect to these items, therefore, the poor have a fundamentally different expenditure pattern from the non-poor, something that is not adequately captured by the income variable. These results, underlying the need to introduce the "poverty" variable in addition to the conventional resource variables, for example income or aggregate expenditure, have implications that extend beyond the present South African data set.

2. Our results show that pensions, transfers and other income have quite different impact on budget shares and in particular transfer and non-transfer income are not spent in the same way. It matters who receives the transfer within the household. This can be viewed as a rejection of the idea of income pooling by the different members of the household.
3. We find that race does not have any impact on pensions. This is a result of some concern since, if public transfer is to be viewed as an instrument for making positive discrimination in favour of the Black households to overcome the legacy of apartheid, then it is not serving such a role.
4. Public pensions and private transfers are generally regarded as substitutes, with the former crowding out the latter. Moreover, most other studies of transfers estimate the determinants of private transfers independently, not only of income but also of public transfers. In this paper, we question the assumption of exogeneity of public transfers and income when estimating the determinants of private transfers. When we account for the endogeneity of public pensions in the private transfers equation we find evidence of crowding out only in the case of households below the poverty line. In fact, for the non-poor households, private and public transfers actually complement each other. This raises important questions regarding the effectiveness of the targeting of the public pension programs because after all the public programs were designed to improve the welfare of the ones in need, which includes the poor.

With the end of apartheid in South Africa, the task of restoring fairness and nullifying the inequities of White minority rule ought to receive one of the highest priorities of the present non-racial government. The social security system in South Africa, with pensions playing a major role in it, is of pivotal importance in the task of national reconstruction. The results presented in this paper are therefore of considerable policy importance. Using recently available panel data from the post apartheid era, the present study can be usefully extended to encompass a wider range of issues, particularly those relating to dynamic considerations.

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