South African HouseholdsÌIntegration
Into The Core Economy -
Micro Level Covariates

Sten Dieden

South African households' integration into the

core economy - micro level covariates

Paper to be presented at the Tips and DPRU ForumThe Challenge of Growth and Poverty:

The South African Economy Since Democracy

Johannesburg 8 - 10 September 2003

Sten Dieden[*]

In this exploratory analysis of household survey data, households' main income sources are used indicators of integration into the South African core economy. Notwithstanding the country's high urbanization rates, the picture of household income generation which emerges is one that disputes common perceptions of the multitude of means by which African households generate their income. The majority of households under scrutiny rely to a large extent on one income source and one income earner. Separate multinomial logit analyses are undertaken for urban and non-urban households. In addition to the divide between urban and non-urban areas, prominent covariates of low core-economy integration are earners of female gender, old or young earner working-age, and low levels of education. Both provincial location and within-provincial, subregional location displays strong impacts. The study also finds associations between main income sources and households' demographic compositions which are compatible to findings both in studies on private transfers behavior and in the growing literature on endogenous household formation in South Africa.

1. Introduction

The relevance of income sources to South African household welfare can be illustrated by two findings that often recur in research on poverty and inequality in the country. Firstly, it is widely recognized that poor households derive substantial shares of their income from transfer incomes that are often either remittances sent by migrant family members or public pensions. Secondly, access to *wage* income has been found a powerful catalyst in avoiding poverty and a crucial explanatory factor in income inequality (e.g. Carter and May (1999), Leibbrandt, Woolard, and Woolard (1996), Leibbrandt and Woolard (1999), Leibbrandt, Woolard, and Bhorat (2000), van der Berg (2000)). There exists several historical reasons to expect households; access to wage income or dependence on transfer incomes to be related to microeconomic factors. This study therefore analyses variation in households' main income sources of various origins, as a process associated with households' demographic composition, location and earners characteristics.

The perhaps most common route to the microeconomic analysis of household income generation in less developed countries is through some version of the "Agricultural household model" (Sing, Squire and Strauss (1986), Sadoulet and de Janvry (1995)). In the basic model, prices and household endowments of land and labour enter as givens and implications are derived for optimal allocation of labour-time between farming activities and off-farm employment as well as own- and cross-price effects on the trade-off between various consumption and leisure.[1] The relevant characteristics of the South African setting for household income generation can be summarized by: (i) very high urbanization rates; (ii) peasant agriculture mostly absent among the rural non-White population; (iii) labour markets often inaccessible in rural areas; and (iv)

---

[1] Neither intra-household sharing of resources nor the question of the exact nature of the decision process that underlies the optimal allocation of household labour to various activities are trivial. Gary Becker's (1965) seminal representation of the "unitary" household presupposes a benevolent household head that induces members to act so as to maximize the combined welfare while objections to the notion of such a head has been raised by Varley (1996). Seminal work on intra-household resource allocation has been done by Haadad and Kanbur (1990) and Thomas (1990).

typically very high unemployment rates in both rural and urban areas. Versions of the agricultural household model that incorporate circumstances specific to *agricultural* households in Southern Africa have been developed by Low(1986), but the conditions for which the model was designed are thus not well matched by the circumstances faced by most South African households.

The articulation of a complete model for the allocation of income sources among households is however not a goal of this study. The focal point of the investigation is on whether any empirical regularities can be identified that can provide a synthesized understanding of differences in main income sources among South African households. The study is not entirely dissimilar in scope from other investigations (see e.g. Lipton, de Klerk, and Lipton (1996), Carter and May(*op cit.*), Posel (2001), Leibbrandt and Woolard (2001)), but it augments to previous research in several ways. Conceptually, the quantitative analyses draw on the finding that a considerable fraction of households derive the bulk of their income from one "main income source", which is very often earned by one or a few individuals in the household. The main income categories are further designed to reflect households' degree of integration into the South African core economy and since such integration can be expected to be a covariate of location separate analyses are carried out for urban and non-urban households.

In terms of methodology, the concentration of household earnings around one main income source warrants an approach whereby households' allocation onto income source categories is analyzed, rather than the more common investigation into shares of income from various origins. The allocation process is analyzed through multinomial logit regression framework, by which the association between explanatory variables and households' main income sources is computed in terms of probability.

The paper proceeds in the following manner. The next section introduces the Statistics South Africa's 1995 October Household Survey (OHS 95) data and explains how this sample is constructed based on its main income source criteria. Section 3 provides the historical and institutional context due to which household level characteristics would have assumed their impact on main income variation in South Africa. In section 4

determinants and considerations suggested by previous studies are discussed. The empirical approach and variables are introduced in section 6 and the results from regression analyses are presented in section 7. Conclusions are drawn in the final section 8.

2. The data, sample delimitation and main income source definition

In October 1995 Statistics South Africa conducted questionnaire-based interviews on a wide range of living standards issues with almost 30.000 households, representing all households in the country and containing nearly 131.000 inhabitants. Two months later most of the households were revisited in a more detailed investigation of their incomes and expenditures. These two surveys are often referred to as the October Household Survey and Income and Expenditure Survey 1995 (henceforth "OHS/IES 95"). All analyses in this study are conducted with the supplied household weights renormalized to sum to zero (see e.g. Deaton (1997)).[2]

For the multivariate analyses in this study a sub-sample consisting of 14621 households that met with three criteria was selected. As a first criterion, only African and coloured households are under study, as these are over-represented among low-income households and face similar historical legacies.[3] Since the quality of the information on individuals' labour market characteristics were greater in the OHS module than in the IES, it was deemed desirable to extract that information from the former. Households in the two data sets are easily matched, but individuals are not. The second criterion therefore requires that all earners in a household must be identified in both surveys. As a consequence, 5% households that met the first criterion were dropped from analyses.

---

[2] The sample for the two surveys was stratified by province, urban and non-urban area and population group. Altogether, 3 000 enumerator areas (EAs) were drawn as primary sampling units, within each of which ten households were visited. The data concerning households were weighted by the estimated number of households in each stratum and, in accordance with instructions from Statistics South Africa, the set of weights with the Income and Expenditure Survey are applied here, as the two surveys are being linked. (Statistics South Africa (1996, 1997a, 1997b).

[3] Apartheid policies defined four main "racial classifications"; African, coloured, Asian/ Indian and white. The discrimination by race ran through all aspects of life and had tremendous effects on everyone's living standards. For these reasons official statistics in South Africa still apply "racial" categories, and here the same approach will be followed (referring to the same categories as "groups").

Finally, the focus here will be on the households that have a *main income source*. Disregarding momentarily the number of earners involved in each household, a main income source can be defined by the fraction of total income originating that source. A perspective on this study's approach to household income is obtained from table 1. Here a main income source will be defined by a cut-off contribution set at 67%, which ensures that the main income source is at least twice as important as any other income source. Table 1 shows the implications from where the defining cut-off contribution is placed on the fraction of sample households considered to have a main income source and on the numbers of earners involved.

Table 1) Households with numbers main income earners by main income definitions, various cut-off contributions levels.

MAIN INCOME'S CONTRIBUTION TO TOTAL HOUSEHOLD INCOME	HOUSEHOLDS W/O MAIN INCOME	NUMBER OF CONTRIBUTORS TO MAIN INCOME					SUM
		1	2	3	4	5	
50%	15.5	71.7	23.6	3.6	1.0	0.1	100.0
67%	29.3	70.8	24.2	3.9	1.0	0.1	100.0
75%	36.5	70.3	24.5	3.9	1.1	0.2	100.0
90%	54.2	71.0	24.2	3.7	1..0	0.1	100.0
100%	74.9	73.0	23.0	3.2	0.7	0.1	100.0
Source OHS/IES95, own computations, weighted figures. n= 21 032							

The second row of the table shows that 70% of the households have an income source which meets the definition of an income source if the defining contribution is drawn at 67%. In more than 70% of the households with a main income source it is earned by one member, and in almost 25% of the households, two earners jointly raise the main income. As can be seen from the rows below, among the households that do meet each definition, the fractions with specific numbers of earners are quite persistent to where the cut-off line is drawn. Two other observations are especially noteworthy. Firstly, from the figures in the second column it can be deducted that 45% of the households raise 90% or more of their income from one source category and secondly, one-quarter of the households derive *all* their income from one source. Thus, almost regardless of by which contribution one defines a main income source, households seem to rely to a high extent on *one or very few earners* and high reliance is also widespread on *a single source of income*.

The magnitude of the fraction of households that do *not* rely on a main income source, but are *diversified* in terms of pecuniary income sources, obviously depends on how such reliance is defined. A multitude of motives for and consequences of livelihood diversification exist (Ellis (2000)), but given the investigation here (on characteristics that are associated with the various main income sources) it is desirable to in as much clear out the characteristics that would drive diversification from those that may be associated with specific main income sources. The investigation will thus be incomplete in that no explanation will be sought for why and by which means some households are more diversified than others.

3. Contextual information and income sources

Compared to the rest of the continent, the perhaps most divergent features of South African household income generation are the very small contributions from agricultural income, interlinked with very widespread dependence on transfer incomes, especially in rural areas (Reardon (1997), Jooma (1991)). This section serves to introduce, in extreme brief, the historical setting in which profoundly complex interlinkages originate between current geographical locations, institutional legacies, and households' demographic and assets endowments, all of which could relate strongly to modes of income generation.

The migration labour system and land policy

Income generation among large parts of South Africa's non-white population cannot be explained outside the context of legacies from the racial segregation, dispossession of land rights, and forced removals inherent in what came to constitute the "migrant labour system" (e.g. Natrass(1981), Wilson and Ramphele (1989), Lester(2000)). At the heart of system was a predominating 'closed-compound system', the roots of which extend back to the vast mineral discoveries in the 1860s, whereby workers were required to live in closed and guarded barracks on mining or manufacturing premises without their families and with few opportunities for leave. As a consequence, cash remittances from migrant workers is still an historically entrenched and important source of income for rural African families (Jooma (*op cit.*)).

The components of the migrant labour system were however coalesced by a battery of laws that further inhibited the landownership and settlement rights of Africans. By the 1913 Natives Land Act the bulk of South African land was reserved for white ownership only. By the same act Africans were denied rights of residence except during work contracts outside designated "reserves" which were the only areas where Africans were allowed to farm their own land. Massive forced relocation of Africans took place to these mostly non-developed areas, amounting to 13% of the total land area, where initially agricultural conditions were often absent or soon deteriorated due to high population densities (Wilson and Ramphele (*op cit.*)).[4]

As time passed, the exclusionary land practices became an all-encompassing system in both rural and urban areas. When the apartheid program was instituted by the Afrikaner National Party in 1948, "influx control" into the urban areas of "white" South Africa became even tighter and from the 1960s Africans were officially considered citizens of the "reserves" (by that time relabelled "tribal areas", "homelands" or "Bantustans"). The general economic and environmental degradation of the former "homelands" ensured that households there became even more entrenched in remittance dependence and continued to send members to provide cheap labour for the major employers elsewhere in South Africa. (Lester(*op cit.*) Bundy (1979)).

The migration of many of the able-bodied from the "tribal areas" also resulted in a "peculiar (and quite unnatural) household structure" (Wilson and Ramphele (*op cit.*)), where children, elderly and women were vastly overrepresented.[5] Interlinked with many of the migrants spending most of their earnings in the economy's core areas or on the majority of goods that were produced there, the process was one of increasing spatially uneven economic development with a highly inequitable distribution of employment opportunities (Wilson and Ramphele (*op cit*)). [6]

---

[4] In the early twentieth commercial forms of labour tenancy and sharecropping still prevailed in some instances. In course of the first half of the century however, commercialisation of white farming and increasing land segregation led to the demise of these practices (Lester(2000)).

[5] Wilson and Ramphele refer to a study of a migration-wise not very intensive area in KwaZulu-Natal where 81% of the residents aged 20-50 were women.

[6] The persistence of oscillating migration and sustained residence by large fractions of the African population group in the formerly designated areas after the abolition of migration regulations in 1986

Labour market performance and earnings towards the end of the apartheid era

Coupled with the migration and settlement regulations, a battery of laws also undermined the African and coloured population's access to education, ability to increase their wages, and their upward mobility in the labour market. These obstacles rendered the population group confined to poorly paid low-skilled employment. Following a series of strikes in the early 1970s an official recognition of African labour rights came to signify an important shift in economic power, in the wake of which followed some improvements in the wages for African workers (Bhorat, Leibbrandt, Maziya, Van der Berg, and Woolard (2001)). With the first oil shock in 1973 however, began a period of economic decline from which the South African economy is still trying to recover. Economic growth rates fell below population growth rates and per capita income declined by 15% from 1974 to 1993. Due to the economic stagnation unemployment rates increased and were further augmented by distorted relative costs of (often subsided) capital and labour, which led to increased mechanisation the consequences of which were particularly grave for rural African wage employment in agriculture (Bhorat, Hodge and Dieden (1998), Bhorat *et al* (*op cit*)) Accordingly, microdata from the early 1990s attest to high poverty and unemployment rates as well as widespread dependence in both urban and rural areas on transfer incomes (SALDRU (1994)*,* Worldbank (1995)).

Implications for households' sources of income

The South African literature usually distinguishes, by one set of labels or another, between at least four broad groups of household income sources: private transfers, public transfers, self-employment, and wage income (see e.g. Carter and May (*op cit.*), Leibbrandt, Woolard, and Woolard (*op cit.*), Leibbrandt and Woolard (1999), Leibbrandt, Woolard, and Bhorat (op cit.), van der Berg (op cit.)). Thus, while wage-earnings are not the only source of income, apartheid in large strangled the opportunities for the non-white population to earn non-remuneration income from land, capital and entrepreneurship. While both private and public transfers were and

---

appears puzzling. A variety of explanations have however been offered among which one finds lack of employment opportunities in rural areas, high costs of relocation to areas of employment, poor access to the urban labour markets, and shortage of housing in the "black" urban residential areas (Murray (1987), Jooma (*op cit.*)).

are common, it need be kept in mind that private remittances would (again) be directly related to economic growth and public transfers at any point in time would depend on government policies of redistribution (Bhorat *et al* (*op cit.*)).

For an illustration of the relationship between the South African macroeconomic performance, employment generation, and the income distribution, Bhorat *et al* (*op cit.*) suggest a decomposition of the South African *labour force* into three groups, according to access to the "modern consumer economy". Through the application of a similar classification here to households' main income sources, these will serve as indicators of integration levels into the South African core economy. By their origin income sources are thus either from the "core" sectors, the "marginal" sectors or of a "peripheral" nature. Here, the "core" sectors include all sectors *except the primary sectors and domestic services*, each of which constitute separate subcategories under "marginal sectors". Capital income and self-employment are also considered core, whereas "private transfers" and "public transfers" are the two subcategories of "peripheral" income sources. More detail on the income source categories are found in Appendix 1.

4. Main income sources in an earnings and labour market context

As a justification for the impending multivariate analyses this section discusses four aspects of the social relevance of the main income concept based on descriptive statistics. Firstly is shown how the distribution of main income sources differs in *urban and non-urban areas*. Secondly, the relationship between households' main income sources and *the income distribution* is discussed. Thereafter is provided some aspects of the extent to which the main income source is *representative of households' total income generation activities*. Finally, *individuals' labour market statuses* are related to their households' main income source.

Urban and non-urban main income sources

The previous section provided several reasons to expect core sector access and main income sources to differ in the in rural and urban samples, but not by the same measures as elsewhere on the continent, in that agricultural activities would be prominent in rural areas. It has been noted by Leibbrandt *et al* (2000), that the IES95

data does not capture agricultural activities for own consumption well. In the final sample here, 8.4% of all households were recorded with either slaughtered domestic animals or harvested crops in the last year. Profit from agricultural activities should be registered in the IES questionnaire under "self-employment", but only 1.1% of the households that had slaughtered or harvested were listed with any self-employment profits at all. These figures presumably understate the importance of agriculture, but left with little choice other than taking the data at face value, agricultural production is not treated as a separate source of income.[7]

Table 2) Distribution of main income sources in the sample, by location.

Main income source	Urban	Non-urban	Total
Core sectors	77.7	42.2	57.6
Primary sectors	1.4	14.1	8.8
Domestic services	3.1	2.9	3.0
Public transfers	14.3	27.0	21.9
Private transfers	3.5	13.9	8.7
Total	100.0	100.0	100.0
N	7394	7272	14621
Source: IES/OHS 95, own computations, weighted figures.			

Since the term "rural" comes with an connotation of pastoral activities and given also the sometimes very high population densities in some of the areas officially classified as "rural", the term "non-urban" will henceforth be applied to areas not within municipal boundaries or that by other means fail to meet the Statistics South Africa definition of "urban".[8] Table 2 shows the distribution of main income sources in the two subsamples. As can be seen, *core sector income is much more prevalent in the urban than in the non-urban sample*, with 77.7% and 42.2% of the households in each sample respectively. Further, urban main income sources are considerably more *concentrated* around either core sector or public transfers main incomes, which together account for more than 90% of the households. At shares of 27% and 14% households rely on private and public transfers respectively, constitute fractions

---

[7] According to May (1996) agricultural production for own consumption assumes several important functions as inter alia a supplementary source of nutrition and as a safety net for vulnerable households in South Africa.

[8] On the matter of non-urban poplation densities, e.g. Mabin (1989) defines "rural slums" as the many areas that were "urban' in respect of their [high] population densities but 'rural' in respect of [the absence of] proper urban infrastructure or service".

nearly twice and four times as large as their counterparts in urban areas. Clearly, location is a key factor in explaining core sector integration.

Table 3) Distribution of main income sources among non-urban households, by household income deciles.

Non-urban	Income source category					
Decile	Core Sectors	Primary sectors	Domestic Service	Public transfers	Private Transfers	Total
1	3.1	22.4	35.2	35.8	32.0	19.6
2	4.3	24.6	18.7	25.4	26.5	16.4
3	6.6	19.3	15.4	20.1	17.4	13.8
4	12.5	15.7	13.1	11.9	10.1	12.5
5	18.5	7.9	9.4	4.0	7.5	11.3
6	16.7	6.2	4.7	1.5	4.1	9.0
7	15.9	2.8	1.4	0.6	2.0	7.6
8	12.4	0.9	1.7	0.3	0.3	5.5
9	6.8	0.2	0.0	0.3	0.3	3.0
10	3.2	0.0	0.4	0.0	0.0	1.4
Sum	100.0	100.0	100.0	100.0	100.0	100.0
Source: IES/OHS 95, own computations, weighted figures. n=7227						

Table 4) Distribution of main income sources among urban households, by household income deciles.

Urban	Income source category					
Decile	Core sectors	Primary Sectors	Domestic Service	Public transfers	Private Transfers	Total
1	1.6	20.9	20.3	28.2	33.8	7.4
2	2.4	20.2	19.2	21.8	23.0	6.7
3	4.7	10.8	22.3	23.3	13.4	8.3
4	8.6	17.2	17.1	13.1	12.8	9.8
5	13.0	11.0	10.2	6.4	8.6	11.8
6	15.9	10.4	7.5	2.6	3.8	13.2
7	17.5	7.3	2.9	2.4	2.3	14.2
8	17.4	0.2	0.5	0.7	0.8	13.7
9	13.1	1.0	0.0	1.1	1.0	10.4
10	5.7	1.0	0.0	0.3	0.4	4.5
Sum	100.0	100.0	100.0	100.0	100.0	100.0
Source: IES/OHS 95, own computations, weighted figures. N=7394						

Main income sources and the income distribution

Tables 3 and 4 relate main income sources to household welfare by showing their distribution across the *population-wide* household income deciles in urban and non-urban areas. Before turning to the distribution of main income sources it need be noted that the fraction of households in each of the four lower deciles in the non-urban areas is nearly twice that of the urban. A common trend in both areas is that roughly 60% of the households with core sector main income sources are found in the fifth to eighth deciles, whereas the same fractions of households are found in the first to fourth deciles for the households with other main income sources.

Moreover, the largest fractions of households at the lower of the income scale are found among households relying on peripheral main income sources and the concentration in the two lower deciles among these households is higher in non-urban areas. However, among the households that rely on the marginal main income sources a very large share - roughly 80% - is found in the four poorest deciles in the non-urban sample. In urban areas the fraction is similar among domestic service households and slightly less at 70% in the primary sector category. The association between households' income levels and main income sources is thus quite evident.

Table 5) Number of non-main income sources, by main income sourc0e.

NUMBER OF NON-MAIN iNCOMES	MAIN INCOME SOURCE					
	Core sector	Primary sector	Domestic services	Public transfers	Private transfers	Sum
0	86.6	97.0	89.3	95.0	96.9	90.2
1	11.3	2.7	7.4	4.4	2.4	8.3
2	1.7	0.4	2.4	0.5	0.2	1.2
3 or more	0.4	0.0	0.9	0.2	0.6	0.3
Sum	100.0	100.0	100.0	100.0	100.0	100.0
Source OHS/IES95, own computations, weighted figures. N= 14 772						

Main income sources as representative of sample households' income generation

Impressions of how representative the main income source is of households' total income generation are provided by tables 5 and 6. The first table shows the distribution of the number of additional, *non-*main income sources in the final sample. As can be seen, *the vast majority of households do not have another source of regular*

income, with the only noteworthy deviations found among households in the core sector and domestic service categories, where additional income are found in 13% and 10% of households respectively.

Table 6 shows the distribution of the number of contributors to individual households' main income earners in the sample. In just over 70% of the households of this sample the main income is earned by one individual, but deviations from the one-earner pattern are found however, in the domestic services and private transfers categories, where the corresponding figures are 82% and 92% respectively.

Table 6) Number of contributors to main income, by main income source.

NUMBER OF EARNERS	MAIN INCOME SOURCE					
	Core sector	Primary sector	Domestic services	Public transfers	Private transfers	Sum
1	68.0	69.5	82.4	68.3	92.5	70.8
2	25.7	24.7	15.1	28.7	6.0	24.2
3	4.7	4.3	1.8	2.7	1.1	3.9
4 or more	1.6	1.5	0.6	0.3	0.4	1.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Source OHS/IES95, own computations, weighted figures. n= 14 772						

Table 7) Adults' labour force status, by households' main income source.

Main income source	Non-participants in labour force				Labour force status among participants				Share of all adults
	Enrolled	Retired	Other	Total	Un-employed	Self-employed	Employed	Sum	
Core	21.2	1.1	4.4	28.7	14.9	4.7	80.3	100	60.4
Primary	11.7	0.2	2.4	17.2	6.4	0.1	93.5	100	6.7
Domestic	28.3	0.9	6.2	39.3	45.1	6.6	48.3	100	2.5
Public tr.	31.7	10.5	22.6	69.7	93.5	1.3	5.2	100	22.9
Private tr.	47.1	0.9	11.3	65.2	95.5	0.9	3.6	100	7.4
Total	23.8	2.6	7.7	34.1	24.5	3.9	71.6	100	100
Source OHS/IES95, own computations, weighted figures. n=66841									

Labour force participation and the main income source categories

Table 7 shows the labour market statuses of adults in the sample.[9] The adults are further categorized according to the main income source of the household in which they live. The left-hand side of the table focuses on the non-participants whereas the right-hand side shows the distribution of participants across the statuses "unemployed", "self-employed" and "employed".

As can be seen, around two-thirds of adult members in households with either type of peripheral main income source are non-participants, but their within non-participation status differ quite dramatically. Nearly half the adults in the private transfers category are enrolled, possibly attesting to a higher of young adults in these households, compared to an enrolment rate around 30% in the public transfers category. Further, both the other categories of non-participation are around 10 percentage points higher in the public transfers category, most likely attesting to public grants being targeted at individuals who no longer do or can participate in the labour force. It should also be noted how *diminutive the fractions of retired individuals are in all other main income categories in this sample*. Returning to the all-over picture, non-participation is also quite high in the domestic services category at nearly 40%, which makes the rate 10 and 20 points higher than in the core sector and primary sector categories respectively.

The right-hand side of the table show evidence that the small fraction of labour force participants in the peripheral income households are unemployed to a dramatically higher extent – at an immense 95% - than the participants from households with core sector main income. Also the very high unemployment rate in domestic services households and the relatively *low* unemployment rate in primary sector households are noteworthy.

---

[9] This study follows the official Statistics South Africa (1997b) definitions of expanded unemployment (including "discouraged seekers") and economically non-active (henceforth "inactive"). A "child" is defined as 14 years old or younger and the definition of an "adult" follows. The term "working-age" refer to adults below the gender-specific retirement ages (see the section on "Public transfers" below). A "retired" individual is above working age and has been captured with labour force activity status "retired" in the OHS 1995 questionnaire.

In conclusion this far, given the strong descriptive association between main income sources, on the one hand, and both income levels and labour market status on the other, little question should remain about the welfare relevance of main income sources. Further, while one-third of the households that met the first two (population group and identification) criteria did *not* have a main income source, the main income source is of considerable relevance to income generation among the approximately 70% of households that *do* have one. Few of those households have other income sources or other members that derive regular income. Hence, implications for vulnerability to the loss of main income earners or incomes are self-evident. There should thus be little doubt that some insight is gained into South African household income generation if variation in main income sources can be explained.[10]

5. Determinants and considerations from previous research

The descriptive statistics in the previous section suggest that explanatory factors for variations in main income sources may be sought *inter alia* among households' endowments of *labour* and the extent which it has been *allocated into employment*. Micro economic determinants of allocation into employment, economic sector, and not least eligibility for transfer incomes, are usually attributed to *individual* characteristics. Given also the high reliance on a single individual for generation of the main income, a search for determinants appears especially warranted among the *characteristics of households' individual main income earners* (henceforth "earners"). Further, there are also several reasons to believe that *the composition of households' non-earner members* may influence the probabilities for various main income sources.

However, two sets of complications have implications for this investigation. The first complication arises from the use of pre-determined variables as explanatory variables and has implications for parameter interpretations. Secondly, a growing body of literature suggests that the living arrangements of South African households alter in response to the economic circumstances of individual members, such as access to

---

[10] In a dynamic perspective Ardington and Lund (1996) raise a valid objection however, to the use of a "dominant source of income" for the analysis of rural livelihoods in that such sources may be of a temporary nature.

certain sources of income (Klasen and Woolard (2001), Edmonds, Mammen, and Miller (2003), Keller (2003)). While no attempts are made here to draw inference as to the nature of such intra-household processes, the case may yet be that explanatory household composition variables are not *statistically* exogenous.

For the above reasons, the remainder of this section first reviews some of the relevant determinants of access to certain income sources that have been recognised in previous research. Following that discussion, some findings from research on South African household formation will state the relevance of endogeneity and where it may be expected. The last subsection thereafter informs of the interpretational consequences from the use of pre-determined explanatory variables.

Unemployment, non-participation, and peripheral income sources
An explanation for *dependence* on transfer income sources that will be evaluated here is whether it is related to higher-than-modal unemployment and/or economically non-active statuses among household members. The use of household members' unemployment status as an explanatory factor for main income sources implicitly suggests that unemployment is considered involuntary (and, as will be discussed below, exogenous).[11] In lieu of the extremely high unemployment rates among households with transfer main income sources and the high concentration of those income sources at the very bottom of the income distribution, the assumption of involuntary unemployment appears reasonable.

As opposed to what will be assumed about unemployment, a healthy working-age adult's *non-participation* in the labour force will be attributed an element of pre-meditated choice. As pointed out by Sahn and Alderman (1988), an estimated probability of labour force participation is often interpreted as the probability that a wage offer exceeds an individual's reservation wage. That reservation wage may be subject to influence from inter alia household composition variables, such e.g. as the

---

[11] The reader familiar with the agricultural household model will recall that non-employment of labour endowments among utility-maximizing households' is explained within that framework as an outcome of the relative strengths of preferences for leisure versus goods consumption. If leisure time is voluntary and unpaid, higher fractions of unemployed among poorer households, implies that such households' position in the income distribution is due their relative strength of their preferences for leisure.

number of children in the household. Presumably the amount of non-employed household labour available to assume responsibilities the home in place of a candidate labour force participant would also affect the participation decision.[12] Hence, the fractions of unemployed and economically non-active (henceforth "inactive") among adult non-contributors to the main income (henceforth "non-earners") enter as explanatory variables.

Employment, core and peripheral sector wage income
A rich literature exists in which both macro economic and micro economic determinants of labour force participation, employment, and earnings have been identified (see e.g. Willis(1986)) several studies of related areas have also been conducted on South African data that attest to determinants of employment being found among age, experience, gender, education, marital status, and race. (e.g. Mwabu and Shultz (2000), Naudé and Serumaga-Zake (op cit.)).

A crucial process for this study is the allocation of employed individuals either the *core* or the *marginal economic sectors*. The channels through which individual characteristics would influence this allocation are both through individual expected earnings and reservation earnings (Wambugu (2003)). The former would differ across sectors by e.g. skills requirements, whereas regional differences in economic activities and transport costs would affect the economic sectors accessible to the household.

Thus in addition to all of the aforementioned determinants and given the spatial discrimination legacies discussed in a previous section, one would also expect location variables to explain variation in main income sources. In addition to the nine provinces of South Africa[13], this study also applies four non-urban and two urban "subregions" that are assumed different from the remaining subregions within each subsample. The definitions follow official definitions from Statistics South Africa (1997b) The non-urban subregions are: (1)"['rural'] semi-towns without a local

---

[12] Similarly, Sahn and Alderman also attract attention to the fact that the more productive assets (often landholdings) the household possesses, the less likely are household members to engage in wage labour. As mentioned previously, little evidence exists in the data for households' involvement in agricultural production. Variation in access to productive assets is therefore assumed absent across households.
[13] The empirical analyses use dummy variables for all provinces except KwaZulu-Natal which serves as the baseline.

authority", (2)"['rural'] town without a local authority which is not situated in a 'tribal area'", (3) "tribal area"[14] and (4) agricultural or amenities area[15]. The urban sub-regions are (1) "Areas with informal dwellings" and (2) "Area with many hostels, e.g. mine, factory, and municipal hostels."

Remittances

Income remitted between relatives and friends are known to be common throughout the developing world (Cox and Jimenez (1990)) and economic theory encompasses a variety of motives for transfer behavior (e.g. Stark (1995)). Much theory around transfers builds on Becker's (1965, 1973, 1974) seminal representations of the "unitary household", in which altruism is a fundamental driving force and both income and resources are allocated so as to maximize the combined welfare of the household. However, Posel (2001) highlights that over the past two decades a large number of studies have compiled evidence that household relations and allocations are not driven purely by altruism and that household members differ in both in interests and powers to implement ambitions.

One informative classification of motives for remitting may be into "altruism" vs. "trade in an exchange of service with the receivers" (de la Brie, Sadoulet, de Janvry, Lambert (2002)), but several other reasons for remitting that would fall into either one or both of these categories jointly have also been put forward.[16] Two studies on South Africa have found a negative impact on private transfers from access to public pensions (Jensen (2001), Case and Deaton, (1998)). Further to South African remittances, Posel (*op cit.*) tests several hypotheses about remittances and estimates the impact on remitted amounts in sole migrant households, from factors such as the

---

[14] This subregion should overlap with the former "homelands" referred to in the previous section.

[15] The label for this subregion is not official but is intended to abbreviates the Statistics South Africa (1997b) definition "area with farms, agricultural holdings, holiday resorts, agricultural schools and colleges and other rural areas".

[16] E.g. Lucas and Stark (1985) and Stark and Lucas (1988) identify *insurance motives* for remitting and also point to the desire to *refund the household's past expenditures* as one driving force (Stark and Lucas (1988), Brown(1997), Poirine (1997)). Other authors suggest that remittances may be perceived as *investments for the future* in prospective inheritance, in status or in social capital (Lucas and Stark (1985), Hoddinott (1992a,b,1994), Guarnizo (1993), De La Cruz, 1995; Brown(1997), Poirine, (1997)). It has also been shown that motives to remit *vary between the genders* both of remitters and receivers. Findings by Hoddinott (1992a) and De La Cruz (1995) identify the importance of the *parent's age and income* in determining remittances has been referred to as the social security motive and studied in a US context by Cox (1990) and in Peru by Cox and Jimenez (1992) and Cox, Eser, and Jimenez (1998).

resource base of the household (including access to pensions), the composition of the receiving household according to migrant kinships, as well as characteristics of the sender, that reflect the migrant's earnings potential and attachment to the household. The results indicate that remittances are sent by a variety of motives. Recognising that remittances are outcomes of highly complex processes, this study however restricts explanatory variables to the fractions of children out of household size and elderly out of adult non-earners, both of which proxy strong covariates in Posel's study. [17]

Public transfers[18]

The South African social security system is quite unique to the continent. While there are social support programmes to cover other circumstances, its *Old Age Pensions* (OAP) system encompass some 60% of the total social security budget ((Budlender (2000)). Women are entitled to pension at the age of 60 and men at 65, and the system is financed by general government revenue. While a means test does apply in practice, it seems to have little effect or not be binding to African households, and the receivers usually collect the maximum amount (Alderman (1999 se Edmonds),Case and Deaton (*op cit.*); Jensen (*op cit.*); Ardington and Lund, (1995), Bertrand, Miller and Mullainathan(2000)). In order to capture pensioners as prospective earners, the cut off-lines for earners' age categories have been drawn to capture the gender specific thresholds for OAP eligibility.

Endogenous household formation

In analyses of the relationship between household formation and income, common practise has until recently been to chiefly perceive living arrangements as exogenous. Several recent findings however imply that two-way causality may apply to South African household formation and income sources. Edmonds *et al* (2003) provide a number of findings which suggest impacts from income sources on household structures. The first relates to migration, where quite naturally absent members constitute a defining characteristic of households that rely on private transfers (see also Wilson and Mamphele (*op cit.*)). However, a process that transplants and expands

---

[17] Posel finds that the precense of children and grandchildren of the migrant have positive impacts, while the precense of parents has a negative impact on remitted amounts.

[18] Details regarding the historical background, institutional characteristics and practical implementation of the South African OAP is found in Lund (1992), Van der Berg (1994) and Case and Deaton (1998).

these demographic characteristics among consecutive generations in the household may arise if younger members are encouraged to migrate due to successful outcomes of the households' previous migration histories. Secondly, the Edmonds *et al* (*op cit.*) have also found that the presence of an OAPs-eligible person in the household *enables* younger members to migrate.[19]

Keller (*op cit.*) reports higher prevalence of multi-generational demographic household structures among the poorest forty percent of households, as measured by *per capita* income. On the same note, Edmonds *et al* (*op. cit*) find that female, pensions-eligible household heads are more likely to reside with their adult children than with certain other relations. Thus, to the extent the poor households in Keller's study overlap with the large fraction of households that rely on public transfers in the four lowest *household* income deciles in this study, these three findings may jointly suggest that OAPs could instigate multi-generational household formations, especially when pensioners are female.

A growing international literature exists on patterns of household formation and unemployment[20], most studies of which take household formation as exogenous. Klasen and Woolard (*op cit.*) use two-stage least squares regression techniques in order to control for causality running from unemployment to household formation around a non-labour income source. The authors find that access to state transfers increases the likelihood of attracting unemployed persons to a household and that unemployed adults reside with their parents longer than do the employed. Consistent with findings also by Bertrand *et al* (2000), Klasen and Woolard also find that households' collection of remittance income, pensions and other non-wage private income is correlated with lower shares of working age adults in labour force

---

[19] To the extent that "pensions funded" migrant members come to transfer amounts that exceed one-third of what the household receives in public transfers, such households have been excluded from this study.

[20] E.g. Atkinson and Mickleright (1991) and Arulampulam and Stewart (1995) focus on issues such as the effects on reservation wages among unemployed from the availability of other household resources and Gregg and Wadsworth (1996) and OECD (1998) provide analyses of polarisation of employment and unemployment as a consequence of concentration of unemployed individuals in households with few or no members in employment.

participation and employment.[21] Consequently, it appears advisable to investigate into simultaneity between income sources and each of the fractions of unemployed, children (which are assumed to constitute an essential of multi-generation households) and inactive members.

Predetermined variables

Arguably variables such as those reflecting household wealth, unemployment or non-participation are predetermined outcomes of past choices. As stated by Glewwe (1991) in the context of investigating determinants of household welfare, in the absence of an identification of the processes and determinants which led up to such, past choices, the analysis is incomplete. Further, parameter estimates for pre-determined explanatory variables must be perceived as explaining the *variation in household main income sources conditional on the past decisions and events* through which they have taken on their current values.

6. Empirical modeling and variables

The identification of characteristics of households with different main income sources proceeds through the use of two, five-way multinomial logistic models. It is thus assumed that the probability for a given household, i, of holding a specific income source, m, is a function of its endowment vector of S explanatory variables, X_i, and a vector of *income-source specific* parameters, β_m, according to:[22]

$$(1) \qquad \Pr(y_i = main\ income\ category_m) = \frac{\exp(X_i \boldsymbol{b}_m)}{\sum_{m=1}^{4} \exp(X_i \boldsymbol{b}_m) + 1}$$

$$i = 1,2,...,n \qquad m = 1,...,4$$

where n is the sample size. In order for the expression to be uniquely defined one set of β's (for the core sector category in this case) are normalized to zero. By the vector

---

[21] The authors do not apply the main income source concept, but find that 60% of the unemployed in their study live in households where someone is employed and 20% live in households receiving remittances.

[22] Long (1997) shows how this model may be derived either as a as a probability model or a discrete choice problem.

Table 8) Summary statistics of explanatory variables.

Variable	Non-urban subsample						Urban subsample					
	n	Mean	Std.dev	Median	Min	Max	n	Mean	Std.dev	Median	Min	Max
African	7227	0.93787	0.24140	1	0	1	7394	0.71788	0.45006	1	0	1
W Cape	7227	0.03999	0.19595	0	0	1	7394	0.15810	0.36486	0	0	1
E Cape	7227	0.26346	0.44054	0	0	1	7394	0.17758	0.38218	0	0	1
N Cape	7227	0.02767	0.16405	0	0	1	7394	0.05937	0.23634	0	0	1
Free State	7227	0.05618	0.23028	0	0	1	7394	0.12794	0.33405	0	0	1
NW Province	7227	0.09852	0.29804	0	0	1	7394	0.08480	0.27860	0	0	1
Gauteng	7227	0.02242	0.14804	0	0	1	7394	0.17568	0.38058	0	0	1
Mpumalanga	7227	0.13754	0.34444	0	0	1	7394	0.05613	0.23018	0	0	1
Limpopo	7227	0.16508	0.37127	0	0	1	7394	0.04138	0.19919	0	0	1
Subregion 1 (N-U / U) "semi-town" / "informal dwellings"	7227	0.05189	0.22182	0	0	1	7394	0.08791	0.28318	0	0	1
Subregion 2 (N-U / U) "town w/o local authority / "hostels"	7227	0.05936	0.23632	0	0	1	7394	0.04274	0.20228	0	0	1
Subregion 3 (N-U / U) "Tribal area" / n.a.	7227	0.56441	0.49587	1	0	1	Not defined.					
Subregion 4 (N-U / U) agricultural or amenities area / n.a.	7227	0.22707	0.41896	0	0	1						
Share of earners female	7227	0.42777	0.44530	0.5	0	1	7394	0.42041	0.41892	0.5	0	1
Share of earners in education category: None	7227	0.27615	0.43380	0	0	1	7394	0.11458	0.30608	0	0	1
Share of earners in education category: Primary	7227	0.45702	0.47909	0	0	1	7394	0.38386	0.45893	0	0	1
Share of earners in education category: Secondary	7227	0.14667	0.33760	0	0	1	7394	0.23388	0.39031	0	0	1
Share of earners in education category: Matriculated	7227	0.06111	0.22508	0	0	1	*					
Share of earners in education category: Tertiary	*						7394	0.11248	0.29892	0	0	1
Share of earners in age category: =19 yrs	7227	0.00830	0.09074	0	0	1	*					
Share of earners in age category: =24 yrs	*						7394	0.02637	0.16025		0	1
Share of earners in age category: 20-24 yrs	7227	0.03003	0.17067	0	0	1	*					
Share of earners in age category: 25-34 yrs	7227	0.21295	0.38875	0	0	1	7394	0.27130	0.41311		0	1
Share of earners in age category: 35-58 yrs	7227	0.47748	0.47718	0.5	0	1	7394	0.51218	0.46603		0	1
Share of earners in age category: = 65 yrs	7227	0.15533	0.34845	0	0	1	7394	0.09157	0.27676		0	1
Number of non-earners	7227	3.54103	2.65037	3	0	28	7394	2.89099	2.27835	3	0	24
Share of non-earners children (= 14 years)	7227	0.41124	0.33924	0.44444	0	1.5	7394	0.38215	0.34897		0	3
Share of adult non-earners unemployed	7227	0.17754	0.32347	0	0	1	7394	0.21071	0.35339		0	1
Share of adult non-earners inactive	7227	0.50433	0.44654	0.5	0	1	7394	0.43263	0.44312		0	1
Share of adult non-earners retired	7227	0.03118	0.13441	0	0	1	7394	0.03974	0.16016		0	1

*) In the non-urban sample the matriculated education category was left out in order to avoid multi-collinearity whereas the corresponding variable in the urban-sample was tertiary education. For similar reasons the earner age category 59-64 years old and the fraction of non-earners in employment were left out and the two youngest earner age categories collapsed in the urban subsample.

of explanatory variables, the ensuing probabilities are thus functions of the characteristics that influence households' access to various types of income.[23]

The explanatory variables encompass geographical variables, earners' age, gender and educational characteristics, the number and composition of households' non-earners as fractions of children out of total household size, and unemployed, inactive, and retired fractions out of the household's adults. Households where several individuals contribute to the main income are incorporated by the use of fractions of earners in each age, gender and education category is used. All non-binary explanatory variables are furthermore measured in terms of deviations from the subsample median values so as it was deemed more informative to express impacts as originating from divergences from modal living arrangements. Summary statistics of these variables in non-normalized format but including median values are displayed in table 8.

7. Empirical results and simulations

Below the regression output from the non-urban and urban subsamples is presented with coefficients in relative risk ratio formats.[24] While useful in terms of the direction and magnitude of the impact on *relative* probabilities from changes in explanatory variables, the relative risk ratio coefficients say little about the *absolute* probabilities yielded by characteristics constellations. After a brief overview of the general fit of the two regression models and the significance of the various categories of explanatory variables, a set of simulation exercises will follow, where both the impacts and absolute probabilities are illustrated. .

---

[23] Amemiya (1985) has shown that under conditions which are likely to apply in practice, the implied likelihood function is globally concave, ensuring unique maximum likelihood estimates.
[24] The concept of "relative risk ratios" is discussed and derived in the Appendix 2.

Regression results

Tables 9 and 10 display the regression output from the non-urban and urban
subsamples. The coefficients in the two models are not directly comparable however,
since in the urban sample the youngest earner category had to be integrated into the
consecutive one and the left-out earner education categories differ. Table K in the
descriptive section showed a considerably larger variation in main
income sources in the non-urban areas and three findings also suggest that the
approach is more warranted as applied to non-urban households' than to urban..

Firstly, a crucial assumption of the multinomial logit approach is that of Independence
of Irrelevant Alternatives. Hausman–tests do support this assumption for non-urban
households but not for the urban. Evidence are that the estimated (ratios of)
probabilities are not stable to the exclusion of the public transfers category in the
urban subsample.[25] At the same time, however, Wald-tests do not support an
improvement in fit in either model from combining any two of the defined outcome
categories.

Secondly, the larger pseudo-coefficient of determination value at 0.466 for the non-
urban subsample vs. 0.416 in urban areas indicates that the non-urban model explains
more variation than the urban.[26] However, the pseudo-R^2 values must be seen in the
perspective of estimates' significance. A general impression can be derived by
studying the fractions of estimates significant at the 10% level or higher in **bold** in
tables 9 and 10. In both samples roughly three-fifths of the estimates are significant
by this measure, but in the non-urban sample the fraction of such coefficients is
considerably lower in the "Domestic services" column. In several respects thus, the
analytical approach appears more valid as applied to the non-urban sample.

---

[25] Intuitively the assumption implies that the *ratio* between estimated probabilities for falling into two
given outcomes should not be affected by the inclusion or exclusion of outcome categories not under
consideration in that ratio. Given the high concentration on two main income source categories in urban
areas, the consequence of dropping the second largest category is not surprising.

[26] The R^2 values may to some extent exaggerate explanatory powers, since the null hypothesis that a
variable may have no effect on the outcome cannot be rejected for certain variables. This applies at the
10% level for four variables in the non-urban and two in the urban, and at the 5% level for two
variables in the former and one in the latter.

Table 9) Multinomial logit estimates of main income category for non-urban households

Number of obs	7227			
Wald chi2(132)	7762.9			
Prob > chi2	0.0000			
Pseudo R2	0.4666			
Log pseudo-likelihood	-5279.851			
Explanatory variables	**Primary sectors**	**Domestic services**	**Public transfers**	**Private transfers**
African	2.04405	0.61395	1.03605	**6.54838***
W Cape (xx)	0.64075	**0.28527***	**0.39602***	**0.22014****
E Cape	1.32097	0.78962	**1.93984***	**2.82971***
N Cape	**2.56043****	0.59357	**0.44304***	1.05754
Free State (xx)	1.55570	1.07447	0.83620	1.96188
NW Province	1.09735	**0.27331***	**0.46746***	**1.74172****
Gauteng	**0.42173****	1.10555	**0.34439****	**0.00000***
Mpumalanga	**2.12659****	1.27793	**0.35108***	**0.47659***
Limpopo	**2.46408****	0.69844	0.83019	1.20403
"Semi-town" (xx)	0.30612	0.51305	1.77728	1.51454
"Town"	0.86293	1.90222	**2.84730***	**2.16183***
"Tribal area"	**0.16346***	0.85128	**1.87107****	**2.35076****
"Agricultural / Amenities area"	**9.31697***	**4.44421***	**1.85986***	0.54362
Sh. MIE female	**0.12407***	**20.87672***	**2.12081****	**4.01293***
Sh. MIE No educ	**157.47530***	**85.13296***	**69.30301***	**71.75535***
Sh. MIE Pr educ	**100.82060***	**76.02725***	**31.02715***	**35.94486***
Sh. MIE Sec educ	**29.97688***	**25.84201***	**10.63469***	**19.85366***
Sh. MIE Matric educ	**9.29269***	4.03614	1.59702	**6.59707***
Sh. MIE =19 yrs	1.40050	2.92179	1.73600	**27.93253***
Sh. MIE 20-24 yrs	0.96514	2.22012	**0.12502***	**3.18766***
Sh. MIE 25-34 yrs	**0.16498***	0.69705	**0.01078***	**0.37855****
Sh. MIE 35-58 yrs	**0.25982***	0.75374	**0.05857***	**0.48056***
Sh. MIE = 65 yrs	**0.38823****	0.66262	**8.28430***	0.67456
Number of non-earners	**0.39217***	**0.63797****	**0.65791***	**0.61894***
Sh. NMIE = 14 (∧)	**529538.900***	27.10337	**222.86410***	**1258.51000***
Sh. NMIE unmp (∧)	**11.38566****	4.56630	**7.03709****	0.56550
Sh. NMIE inact (∧)	**15.23004***	2.33977	**3.26696****	**5.05327****
Sh NMIE retired	**0.44879***	0.59248	**0.42351****	**0.05340***
	20	8	22	21
χ-2- value Hausman test of IIA when category omitted	-136.868 Supported	-36.962 Supported	-116.479 Supported	-1.413 Supported
Significance levels are based on standard errors that take the clustered nature of the sample into account.				
Symbols: (x) / (xx) Wald test H(0): Variable's all coefficients = 0, not rejected at 5 / 10%				
(∧) Endogenous, observed variable replaced by prediction.				

Table 10) Multinomial logit estimates of main income category for urban households

Number of obs	7394			
Wald chi2(132)	6208.08			
Prob > chi2	0.0000			
Pseudo R2	0.4157			
Log pseudo-likelihood	-3283.7381			
Explanatory variables	**Primary sectors**	**Domestic services**	**Public transfers**	**Private transfers**
African	1.04468	**1.63991****	0.80943	**2.98257*****
W Cape (xx)	**5.91782*****	0.86574	1.16471	0.72016
E Cape	2.11485	0.88104	**2.39192*****	**2.86299*****
N Cape	**7.46062*****	**2.16152***	**3.40219*****	**3.82378*****
Free State	1.30869	1.41806	**2.09269*****	**2.85542*****
NW Province (xx)	**4.79739***	0.60118	1.11656	1.10713
Gauteng	0.46770	1.08087	**0.51253*****	**0.25269*****
Mpumalanga	**7.27711*****	0.86049	0.69805	0.53631
Limpopo	**35.48899*****	**0.10552****	0.97750	1.06873
"Informal dwellings"	**3.06060****	**1.70873****	**1.40315***	1.00114
"Many hostels"	**0.03607*****	**0.05472*****	**0.05848*****	0.27391
Sh. MIE female	0.97348	**17.47760*****	**4.38434*****	**6.12732*****
Sh. MIE No educ	**18.81432*****	**20.94712*****	**29.51462*****	**5.32054*****
Sh. MIE Pri educ	**10.94092*****	**12.92112*****	**10.28758*****	**3.95122*****
Sh. MIE Sec educ (xx)	**5.57399*****	**3.94972*****	**4.82111*****	**2.27097*****
Sh. MIE Mat educ	**0.00000*****	0.16140	1.18693	**0.16509*****
Sh. MIE =24	**2.24255***	**3.48441***	**0.27048*****	**6.38914*****
Sh. MIE 25-34	0.87655	1.95555	**0.05183*****	0.90214
Sh. MIE 35-58	**0.49383***	1.54814	**0.13240*****	0.75005
Sh. MIE = 65	0.61828	1.54856	**26.16672*****	2.52854
Number of non-earners (xx)	0.91678	**0.92315***	0.96920	**0.89553****
Sh. NMIE = 14	0.88970	**0.34898*****	**0.57037*****	0.86912
Sh. NMIE unmp (xx)	**0.45451***	0.62907	0.98534	0.92097
Sh. NMIE inact (-)	0.81849	**0.53682****	**0.51114*****	**0.71796***
Sh NMIE retired	**0.04807****	**0.19708****	**0.16891*****	**0.18525****
χ-2- value Hausman test of IIA when category omitted	-0.896 Supported	1.106 Supported	5861.09 Not Supported	4.336 Supported
Significance levels are based on standard errors that take the clustered nature of the sample into account.				
Symbols: (x) / (xx) Wald test H(0): Variable's all coefficients = 0, not rejected at 5 / 10%				
(-) Endogenous, observed variable not replaced by prediction.				

Source: OHS/IES95, own computations, weighted data.

In the vertical dimension the variables in the output are divided into three sections, where (from top to bottom) the first section includes household level variables, with dashed lines serving to separate both the African, province and sub-region dummy variables. The middle section constitutes the earner characteristics and the lower section contains the non-earner composition characteristics. In both sets of output, the

middle section has the highest prevalence of significant estimates, which attests to the high relevance of earner characteristics and – as revealed by a closer look - most prominently of education levels.

In both subsamples main income sources appear subject to both inter-provincial and regional variation, while the African population dummy has a significant estimate for only one outcome category in the urban output and two in the non-urban. Furthermore, three-quarters of the estimates for non-earner characteristics are significant in the non-urban-subsample and over half in the non-urban. It should be especially noted though that in urban areas all the coefficients for all the composition fractions variables including that of children are less than unity, indicating diminishing impacts probabilities for non-core income source from higher fractions of non-earner members of any kind. The opposite is true for non-urban areas and *especially* for the fraction children.

However, in the *non-urban subsample* the exogeneity of the variables for the fractions of children out of total household size, and for the unemployed as well as the inactive of out of adult members, could not be maintained at the 10% level. Consequently these variables were replaced with predictions through a *manual* two-step procedure.[27] The relevant cells are therefore shaded in grey to caution the reader as to the invalid significance levels. The deeper gray indicates that endogeneity was not rejected at the 10% level for the outcome (in non-urban sample the estimates in the deeper gray cells were and remain not significant). In the urban regression one variable was endogenous in one outcome category (at the 9.2% level of significance) and was *not* replaced by a prediction. Thus, the shaded cells in the urban output also cautions against possibly biased estimates and invalid significance levels. While the direction of causality from these variables may be open to discussion, the high and prevalent

---

[27] The variables were tested for endogeneity by the method suggested by Rivers and Young (1988), using four variables for the fractions of adult non-earners in each education category as additional exogenous variables. Prior tests proved that the number of non-earners is exogenous in both models. Under the assumption of normally distributed errors in the first stage regression a two-step estimator can be used to correct for endogenous variables (Wooldridge (2002)). However, the second-stage standard errors and test-statistics derived by a *manual* method are not valid (Wooldridge (1999)). Comparing table Y to its corresponding test-regression in the statistical appendix reveals however, that the magnitudes of coefficients for these variables do not differ significantly between the two regressions. Thus, the same estimates are generated when the first-step residuals "clear up" the endogeneity as when the predictors are used (cf. Wooldridge (*op cit.*)).

significance of the predictors are consistent with some interaction between household non-earner composition and income sources.

Simulations

The direction and strength of impact as well as the absolute probabilities associated with some of the key explanatory variables will now be illustrated through four sets of simulations in tables 11-14, three of which are based on the non-urban estimates and one on the urban. The first simulation in table 11 illustrates the impact of a single main income earner's gender and age in a household of five, with three children and an inactive member. The household is assumed to reside in a "tribal area" in KwaZulu-Natal and the earner has primary education only.

Table 11) Simulation of impact from main income earner's gender and age

Earner	Primary sector	Domestic services	Public transfers	Private transfers	Core sector
Male aged 35 – 58	10.3	0.6	9.7	22.9	**56.6**
Female aged 35 – 58	0.7	6.6	11.3	**50.3**	**31.1**
Female aged 25 – 34	0.6	7.7	2.6	**50.0**	**39.2**
Female aged 59 – 64	0.8	2.6	**56.7**	**30.8**	9.1
Male aged 25 – 34	7.8	0.6	2.1	21.6	**67.8**
Male aged 59 – 64	12.8	0.2	53.4	15.3	**18.3**

With a male main income earner in the age category 35-58 years old (in the first row) the probability that the household has a *core sector* main income sources is over 55%. However if the earner were a *female* of the same age (as illustrated in the second row), the probability for core sector is reduced to below one-third and a 50% probability exists that the household rather relies on *private transfers*. If the female earner belonged to the *younger age category 25-34*, the same probability prevails for private transfers, but chances for core sector main income have increased slightly to 39%. If the female earner were *older and aged 58-64*, the probability for private transfer income is reduced to 30% while the likelihood for *public transfers* is now just over 55%. If the same age alterations are applied to the *male earner* the probability for *core sector* income increases considerably to over *two-thirds* in the *younger* case, but

are reduced to below 20% in the older case.[28] Thus, *variations in the gender and age of the main income earner* seem strongly associated with changes in probabilities for different types of main income sources.

The second simulation in table 12 illustrates the impact of education and sub-regional location for the same household under the assumption that the main income earner is a female in the age category 35-58. In the first case the household still resides in a "Tribal area" but the main earner has *no education*. The probability that the household depends on private transfers is just over 60% and for core sector main income it is just below 20%. Raising the educational level to primary schooling (equivalent to the second case above) yields the corresponding probabilities at 50% and 31% respectively. A marked increase in the probability for core sector main income to over 45% follows an increase in earner's education to secondary schooling, but the private transfers probability remains at over 40%.

Table 12) Simulation of impact from main income earner's education and non-urban households' subregional location

Education	Location	Primary Sector	Domestic services	Public Transfers	Private transfers	Core sector
None	"Tribal area"	0.7	4.5	15.2	**60.8**	**18.8**
Primary	"Tribal area"	0.7	6.6	11.3	**50.3**	**31.1**
Secondary	"Tribal area"	0.3	3.4	5.9	**42.6**	**47.7**
None	"Agr. / amenities area"	**34.6**	**21.4**	13.9	**12.9**	**17.2**
Primary	"Agr. /amenities area"	**31.1**	**26.9**	8.7	9.1	**24.2**
Secondary	"Agr. /amenities area"	**18.3**	**18.1**	5.9	9.9	**47.9**

If the same household had resided in an "Agricultural or amenities area" the trend with respect to changes in core sector main income probabilities is similar and ends at the same level. A most notable difference however, is that *the likelihood for transfer dependence is considerably lower* and diminishes with education. The counter phenomena are that probabilities for marginal sector incomes are dramatically larger, initially at a summed likelihood over 50% but decreasing with education to 18% each. Thus, while increased levels of education seem to vastly improve chances of

---

[28] Despite the fact that males in the last age category are not entitled to OAPs the high probability for public transfer main incomes suggest that the age effect in this case dominates the gender effects and that improved predictions could have been derived by interacting age/gender variables in the regression analyses.

households having core sector main income regardless of location, the probabilities for private transfer dependence seem strongly affected by location and also affected by the earner's level of education.

Before turning to the last rural simulation, the importance of provincial location and the number of non-earners in the household, will be illustrated in table 13. The default urban household resides in KwaZulu-Natal and consists of four members, two of which are children and one of which is an earner in the age category 59-64 years. With a male earner the model returns a probability for core sector main income in over 80%. If the earner were female the probability for the same sector income drops to 50% and chances are one-third for public transfer incomes.

Table 13) Simulated impact from urban households' provincial location

Province	African	Earner	Primary sector	Domestic services	Public transfers	Private transfers	Core Sector
KZN	Yes	M	0.7	0.3	**14.4**	2.0	**82.6**
KZN	Yes	F	0.4	3.3	**38.4**	7.5	**50.4**
E Cape	Yes	F	0.5	1.7	**54.8**	12.9	**30.1**
N Cape	No	F	1.3	1.9	**70.6**	4.2	**22.0**
Gauteng	No	F	0.2	2.8	**31.3**	0.8	**64.9**
Gauteng	No	M+F	0.2	0.3	**8.5**	0.2	**90.8**

Moving the last household constellation to the Eastern Cape increases the public transfer probability to almost 55% and reduces the core income likelihood to less than one third. Shifting location to the Northern Cape and population group to coloured raises the probability for public transfers to 70% and reduces chances for core income to less than one-quarter. If the household resided in Gauteng however, chances for core sector income increase dramatically to almost 65%. Finally, if the household rather had two earners - one of each gender - the likelihood that it is a core sector main income household peaks at 90%. The last point illustrates that households which access "better" main income sources are also positively associated with having several earners.

Table 14) Simulated impact from non-earner household characteristics

Earner	No. of children	Adults	Primary Sector	Domestic Services	Public transfers	Private transfers	Core sector
Female 20-24	2	2 inact.	0.2	7.1	6.3	**68.6**	17.8
Female 20-24	3	1 inact.	0.6	4.7	5.9	**81.2**	7.6
Female 20-24	3	1 retired	0.6	8.2	8.6	**63.9**	18.6
Female 59-64	3	1 inact.	0.8	2.6	**56.7**	30.8	9.1
Female 59-64	3	1 unmp.	0.7	3.1	**69.0**	17.9	**9.2**
Female 59-64	2	2 unmp.	0.2	4.3	**71.3**	7.0	**17.2**

A final simulation in table 14 illustrates the associations between main income sources and household composition factors, represented by the impact from labour force status of non-earners and the presence of children in the households The initial household again resides in a non-urban, "tribal area" in KwaZulu-Natal and has female earner aged 20-24 years old with primary education. The other household members initially encompass two children and two inactive non-earners. The default household has a probability just below 70% for being private transfers dependent. If an inactive adult were replaced by an *additional child*, the probability for private transfers increases – as would be expected from theory - to over 80%. By shifting the remaining inactive member into *retired* status, the same probability drops to below 65% which still very high, but the impact suggests *a negative association between the presence of retirement aged members and private transfers dependence*.

By turning the adults' roles around and letting the retirement-aged member be a female earner and the younger female be an *inactive* member, the chances of *private* transfers dependence drops to 31% and yields a 57% probability for the household relying on a *public transfers* main income. If the younger female's labour force status is then altered to *unemployed*, the probabilities between the two transfers shift by twelve points *in favour of public transfers* which *reduces the likelihood for the other transfer main income by almost one-half*. This prediction is compatible with earlier findings of a positive association between unemployed household members and pensions collecting households (Klasen and Woolard (*op cit.*), Edmonds *et al* (*op cit.*), Keller (*op cit.*)).

Finally, by replacing one child with an additional unemployed adult member, the in the probability for public transfers increases by only three percentage points. At the same time the probability for private transfers drops drastically, whereas the probability for core sector income doubles. In conjunction these there shifts illustrate a *strong*, *positive association between the presence of children and dependence on either type of transfers in rural areas.*

8. Conclusions

This study proceeds from a finding that among African and coloured South African captured by the 1995 October Household Survey, some seventy percent had *one main source of income* that contributed two-thirds or more to the household's total income. With substantial implications for the vulnerability to the loss of earners, among the households that had a main income source a similar fraction relies on *one earner*. While inference to the total population can only be undertaken subject consideration of the intentional selection of households with a main income source, a classification of these sources according to core-economy integration provides a useful perspective on the very different patterns of income generation in urban and a non-urban areas. Furthermore, within both of these subsamples low integration is correlated both with a position at the lower end of the household income distribution and with very low participation and employment rates among adult household members.

In addition to the much lower frequency of core economy income sources in non-urban areas, results from multinomial logit regression analyses imply that the *gender, education and age of main income earners* all have considerable impact on integration by main income sources. The likelihood for revealing a low extent of integration increases if the main income is earned by women, by elderly or earners of young working age, and by individuals with low levels of education. Within the urban and non-urban subsamples main income sources are also subject to *inter-provincial variation*. Of particular concern with low core-sector integration among both urban and non-urban households are the Eastern and Northern Cape provinces.

Within the non-urban subsample the probabilities for holding the various main income sources also vary across *subregions*. Higher probabilities for reliance on private or public transfer incomes were found to be associated with residence in the former "tribal areas". Residence in agricultural or otherwise commercialized non-urban areas of e.g. Mpumalanga, Limpopo, and the Northern Cape, drastically reduce probabilities for transfer incomes. At the same time, such location raise probabilities for marginal, primary sector, or domestic services main income sources, which are virtually as prevalent at the lower end of the income distribution as are the peripheral, transfer incomes.

Another trait particular to non-urban households are the many and strong associations between main income source probabilities and *the characteristics of household members that do not raise that income.* In accordance with previous findings high fractions of unemployed are strongly and positively associated with public transfers (Klasen and Woolard (*op cit.*), Edmonds *et al* (*op cit.*), Betrand *et al* (*op cit.*). Large fractions of economically non-active members is positive associated with both types of transfer income sources, but stronger for private transfers. Furthermore, but only in non-urban areas, higher-than-modal fractions of children are strongly and positively associated with probabilities for all non-core main income sources.

It has been noted by e.g. Keller (*op cit.*) that poor households differ from the non-poor in terms of generation structure. One implied explanation for that phenomenon follows from that both types of transfer incomes, which are densely present in the lower end of the income distribution, are age or life-cycle driven. Elderly individuals receive pensions, while younger women often have young children and are therefore more likely to receive private transfers. Multi-generation households arise then in accordance with previous findings when public pensions benefit the family members of receivers as grandparents help their children and grandchildren (Edmonds et al (*op. cit*), Klasen and Woolard (*op. cit*)). The negative association between retired non-contributors and non-core main income sources however, indicates that the opposite may not be true for households outside the core economy.

It is questionable whether the now eight year old patterns of living arrangements and income sources depicted from this data still prevail and whether derived policy implications still apply. However, not unlike a number of other studies, results from this investigation would promote ambitions towards" employment creation". If such polices could by somehow be invented, they would be especially useful if spatially targeted and assimilated to the very different patterns of characteristics of non-integration that exist between urban and non-urban areas, and across provinces and subregions. The vast variability in means of income generation across space also warrants more spatially targeted research efforts.

The considerable impact even from very low levels of education on core sector access suggests that adult literacy programs may promote integration of marginalized or peripheral households. Finally, since 1995 one can hope that the collection of both Old Age Pensions and Child Support Grants have increased. Especially the latter policies is supported for poverty alleviation purposes since targeting transfers at children and young mothers would target the often very poor, transfer dependent households but may also come to the benefit of the elderly. However, to the extent that household formation is endogenous to such transfers, households may have reshaped in the face of the increased collection of such transfers. Answers to that question and whether the high concentration around a single income source and few earners still apply can only be answered if reliable, recent income data is made available.

References

Amemiya, T. (1985). *Advanced Econometrics.* Cambridge, MA: Harvard University Press.

Ardington, E., and Lund, F. (1995). Pensions and Development: Social Security as Complementary to Programmes of Reconstruction and Development. *Development Southern Africa* **12:4**.

Ardington, E., and Lund, F. (1996). "Questioning rural livelihoods", Ch.2 in Lipton *et al* (1996).

Arulampalam, Wiji, and Mark Stewart. 1995. "The Determinants of Individual Unemployment Durations in an Era of High Unemployment." Economic Journal 105: 321-332.

Atkinson, A. and Micklewright, J. (1991). "Unemployment Compensation and Labor Market Transitions: A Critical Review." *Journal of Economic Literature* **29**

Becker, G. (1965) "A Theory of the Allocation of Time." in *Economic Journal 175*.

Becker, G. (1973), "A theory of marriage: Part I." *Journal of Political economy 81*

Becker, G. (1974), "A theory of marriage: Part I." *Journal of Political economy 82*

Bertrand, M. , Miller, D., and Mullainathan, S. (2000). "Public Policy and Extended Families: Evidence from South Africa." NBER Working Paper 7594. http://www.nber.org/papers/w7594.

Bhorat. H., Hodge, J. and Dieden, S.(1998) "The Impact of Structural and Production Method Change on Employment Growth of Occupational Groups in South Africa."*The Trade & Industry Monitor"*, **6:2**. Development Policy Research Unit, University of Cape Town, South Africa.

Bhorat, H., Leibbrandt, M., Maziya, M., Van der Berg, S., Woolard I. (2001). *Fighting Poverty – Labour Markets And Inequality in South Africa.* Cape Town, South Africa: UCT Press.

Brown, R. (1997) "Estimating remittance functions for Pacific Island migrants." *World Development 25:4*

Budlender, D. (2000). "Human development", Chapter 5 in *May (2000).*

Bundy, C. (1979). *The destruction of African peasantry.*

Carter, M. and May, J. (1999) "Poverty, Livelihood and Class in Rural South Africa", in *World Development* **27**.

Case, A., and Deaton, A. (1998). "Large Cash Transfers to the Elderly in South Africa"*Economic Journal 108*

Cox, D. (1990) "Intergenerational transfers and liquidity constraints." *Quarterly Journal of Economics* **105:1**

Cox, D., and Jimenez, E.(1990). "Achieving social objectives through private transfers: a review." *World Bank Research Observer 5:2*.

Cox, D., and Jimenez, E. (1992). "Social security and private transfers in a developing country: the case of Peru." *The World Bank Economic Review* **6:1**

Cox, D., Eser, Z., Jimenez, E. (1998) "Motives for private transfers over the life cycle: an analytical framework and evidence from Peru." *Journal of Development Economics* **55:1**

Deaton, A. (1997). *The analysis of household surveys: A microeconometric approach to development policy.* Baltimore, MD: John Hopkins University Press.

de la Brie`re, B., Sadoulet, E., de Janvry, A. (2002). "The roles of destination, gender, and householdcomposition in explaining remittances: an analysis for the Dominican Sierra". *Journal of Development Economics 68*

De La Cruz, B.E. (1995) "The socioeconomic dimensions of remittances: case studies of five Mexican families." *The Berkeley McNair Journal 3*

Edmonds, E., Mammen, K., and Miller, L., (2003). "Rearranging the Family? Income Support and Elderly Living Arrangements in a Low Income Country", Working Paper, University of Dartmouth, Department of Economics.

Ellis, F. (2000) "Rural Livelihoods and Diversity in Developing Countries". Oxford , UK: Oxford University Press.

Fox, R. (2000), "Agriculture and rural development". Ch.9 in Fox and Rowntree (2000).

Fox, R., and Rowntree, K.(eds) (2000). The Geography of South Africa in a Changing World. Cape Town, South Africa Oxford University Press Southern Africa.

Glewwe, P. (1991). "Investigating the determinants of household welfare in Côite d'Ivoire". *Journal of Development Economics* **35**

Gregg, P., and Wadsworth, J. (1996). "It takes two: Employment Polarization in the OECD." *Centre for Economic Performance Discussion Paper No. 304*

Guarnizo, L.E. (1993). "Going home: class, gender and household transformation among dominican return migrants." Georgetown University. Mimeo.

Haddad, L., and Kanbur, R., (1990). How Serious is the Neglect of Intra-Household Inequality?" *Economic Journal* **100**

Hoddinott, J. (1992a) "Modeling remittance flows in Kenya." *Journal of African Economies* **1:2**

Hoddinott, J. (1992b). "Rotten kids or manipulative parents: are children old age security in western Kenya?" *Economic Development and Cultural Change* **40:3**

Hoddinott, J. (1994). "A model of migration and remittances applied to western Kenya." *Oxford Economic Papers* **46:3**

Jensen, R. (2001). "Public Transfers, Private Transfers, and the 'Crowding Out' Hypothesis: Evidence from South Africa." *Journal of Public Economics*

Jooma, A. (1991). "Migrancey After Influx Control." South African Institute for Race Relations, Johannesburg, South Africa.

Keller, S. (2003), Household Formation, Poverty and Unemploment: the Case of Rural Households in South Africa." Paper presented at Centre for Social Sciences Research, August 2003. University of Cape Town, South Africa.

Klasen, S., and Woolard, I., (2001) "Surviving Unemployment without State Support: Unemployment and Household Formation in South Africa". Paper presented at the European Economic Association conference, August 2001, Lausanne, Switzerland.

Leibbrandt, M. and Woolard, I. (1999)[*] "Measuring Poverty in South Africa". *Development Southern Africa,* **16:1**.

Leibbrandt, M. and Woolard, I. (2001) "Household incomes, poverty and inequality in a multivariate framework" in *Bhorat et al* (2001).

Leibbrandt, M., Woolard, I., and Bhorat. H. (2000).[*] "Understanding Contemporary Household Inequality in South Africa" in *Studies in Economics and Econometrics*, **24**:3

Leibbrandt, M. Woolard, C., and Woolard, I (2000). *The contribution of income components to income inequality: a decomposable gini analysis.* Journal of African Economies **9**

---

[*] Also published in Bhorat *et al* (2001)

Lester, A., "Historical geography". Ch. 3 in Fox and Rowntree (2000).

Lipton, M., de Klerk, M., and Lipton, M. (eds.) (1996) *Land, labour, and livelihoods in rural South Africa.* Durban, South Africa: Indicator Press.

Long, J. S. (1997) *Regression models for categorical and limited dependent variables.* Thousand Oaks, CA: Sage Publications.

Low, A. (1986)." Agricultural development in southern Africa: farm-household economics and the food crisis". London: J. Currey Portsmouth.

Lund, F., (1992). "State Social Transfers in South Africa" *International Social Security Review* **46**

Lucas, R., Stark, O. (1985)." Motivations to remit: evidence from Botswana." *Journal of Political Economy* **93:5**

Mabin, A. (1989), "Struggle for the city: Urbanisation and political strategies of the South African State." *Social Dynamics* **15**

May, J. (1996), *Land, labour, and rural livelihoods in KwaZulu-Natal*, Ch.2 in Lipton et al (1996).

May, J. (ed.) (2000). *Poverty and inequality in South Africa: meeting the challenge.* Cape Town, South Africa: David Philip Publishers.

Murray, C. "Displaced urbanization: South Africa's rural slums." *African Affairs* **86.** University of Cape Town, South Africa.

Mwabu, G., and Schultz, T. P. (2000). "Wage premia for schooling and location, by gender and race in South Africa." *Economic Development and Cultural Change* **48:2**

Naude, W., and Serumaga-Zake, P.(2001). "An analysis of the determinants of labour force participation and unemployment in South Africa's North-West province." *Development Southern Africa* **18:3**

Natrass, J. (1981). The South African Economy: its growth and change. Cape Town, South Africa: Oxford University Press.

OECD (1998). Employment Outlook June 1998. Paris: OECD.

Poirine, B. (1997). "A theory of remittances as an implicit family loan arrangement." *World Development* **25:4**

Posel, D. (2001). "How Do Households Work? Migration, the Household and Remittance Beahviour in South Africa." *Social Dynamics* **27**

Reardon, T. (1997). "Using Evidence of Household Income Diversification to Inform Study of the Rural Nonfarm Labour Market in Africa" *World Development* **25:5**.

Rivers, D. and Voung, Q.H. (1988). "Limited Information Estimators and Exogeneity Tests for Simulateous Probit Models" in *The Journal of Econometrics* **39**.

Sadoulet, E., and de Janvry, A., (1995). "Quantitative development policy analysis".Baltimore, MD: John Hopkins University Press.

Sahn, D. E., and Alderman, H. (1998). "The Effects of Human Capital on Wages, and the Determinants of Labor Supply in a Developing Country" in *Journal of Development Economics* **29**

SALDRU (1994). *South Africans Rich and Poor: Baseline Household Statistics*. Cape Town, South Africa: Southern Africa labour and development research unit, University of Cape Town.

Sing, I., Squire, L., and Strauss, J., (1986). Agricultural Household Models: Extensions and applications. Baltimore, MD.: John Hopkins University Press.

Stark, O. (1995). *"Altruism and beyond: An Economic Analysis of Transfers and Exchanges within Families and Groups."*, Cambridge, Cambridge University Press.

Stark, O., and Lucas, R. (1988). "Migration, remittances and the family." *Economic Development and Cultural Change 36:3*

Statistics South Africa (1996). *Living in South Africa. Selected findings of the 1995 October household survey.* Statistics South Africa, Pretoria.

Statistics South Africa (1997a). *Earning and spending in South Africa Selected findings of the 1995 income and expenditure survey.* Statistics South Africa, Pretoria.

Statistics South Africa (1997b). Documentation supplied with OHS and IES1995 raw data sets. Statistics South Africa, Pretoria.

Thomas, D. (1990). "Intra-Household Resource Allocation. An Inferential Approach." in the *Journal of Human Resources*, **XXV**.

van der Berg, S. (1994) ""Issues in South African Social Security", mimeo, IBRD.

van der Berg, S. (2000) "Social policies to address poverty" in *Bhorat et al (2001)*.

Varley, A, (1996). "Women heading households: some more equal than others?" World Development **24**.

Wambugu, A. (2003) "Essays on Earnings and Human Capital in Kenya" Ph.D. thesis, School of Economics, Gothenburg University, Sweden.

Willis, R. J., (1986). "Wage determinants: a survey and reinterpretation of human capital earnings functions." In Ashenfelter, O. and Layard, R. (Eds), *Handbook of labor economics*, Volume I, North-Holland: Elsevier Science.

Wilson, F. and Ramphele, M. (1989), *Uprooting poverty: the South African challenge.* Cape Town, South Africa: David Philip Publishers

Wooldridge, J. M. (2002). Econometric Analysis of Cross Section and Panel Data. Cambridge, MA: The MIT Press.

Wooldridge, J. M. (1999) Introductory Econometrics – A Modern Approach. Stamford, CT; Thomson Learning.

World Bank (1995). *Key Indicators of Poverty in South Africa*. Pretoria, South Africa:

South African Communication Service.

Appendix 1 Main income source categories

In as close approximation as possible of the wording in the IES95 questionnaire the income source categories used in this study are defined as follows:

Core economy origin: Salaries and wages[29] from secondary sectors (including mining and quarrying), private services, public services, and residual "other" sectors. Self-employment income in the form of net profit from business or professional practice/activities conducted on a full time basis. *Capital income* from the letting of fixed property, royalties, interests, dividends and annuities.

Primary sector income: salaries and wages as above from agriculture, fishing, and forestry.

Domestic services income: salaries and wages from private households.

Private transfers: alimony, maintenance and similar allowances from divorced spouses or family members living elsewhere and regular allowances from family members living elsewhere.

Pensions and public transfers: pensions resulting from own employment, old age and war pensions, social pensions or allowances in terms of disability grants, family and other allowances, or from funds such as e.g. the Workmen's Compensation, Unemployment Insurance, Pneumoconioses and Silicosis funds.

---

[29] In the "salaries and wages" concept is included bonuses and income from over time, commissions and directors fees, part-time work and cash allowances in respect of transport, housing and clothing.

No main income source: No single income source as defined above contributes 67% of the total monthly income. The category also includes households relying on *indirect income* derived from [i] hobbies, side-lines, part-time activities, or the sales of vehicles, property etc; [ii] payments received from boarders and other members of the household; [iii] the pecuniary value of goods and services received by virtue of occupation; [iv] gratuities and lump sum payments from pension, provident and other insurance or from private persons; [v] 'other income' withdrawals, bursaries, benefits, donations and gifts, bridal payment or dowries and all 'other income'.

Appendix 2 Relative risk ratios

It follows from equation (1) that the marginal effect of explanatory variable s on the probability that household i has main income source m is given by

$$\frac{\partial \Pr(y_i = m \mid X_i)}{\partial x_s} = \Pr(y_i = m \mid X_i)\left[\boldsymbol{b}_{sm} - \sum_{k=1}^{4} \boldsymbol{b}_{sk} \Pr(y_i = k \mid X_i) \right]$$

The marginal impact depends thus not only on the change in variable s and the coefficient for that variable, but on the level of variable s and of all other variables as well all the other slope parameters. Consequentially, marginal effects will vary with the variable values at which they are estimated and the sign of the marginal effect need not match that of the slope parameter.

Hence, the individual slope parameters convey little information *per se*. The regression output is therefore presented by their exponential value or in "relative risk ratio" format. This mode of presentation can be derived from the relative probability of outcome *m* versus outcome *p* given X_i,:

$$2) \quad RR_{i(m/p)}(X_i) \equiv \frac{\Pr(y_i = m \mid X_i)}{\Pr(y_i = p \mid X_i)} = \frac{\exp(X_i \boldsymbol{b}_m)}{\exp(X_i \boldsymbol{b}_p)} = \exp(X_i(\boldsymbol{b}_m - \boldsymbol{b}_p))$$

Equation 2) defines the *risk ratio*. If outcome *p* is the category for which the parameters are normalized to zero 2) reduces to:

$$2') \quad RR_{i(m/1)} \equiv \exp(X_i \boldsymbol{b}_m)$$

the value of which does not depend on the probabilities for the other outcomes.

In terms of expression 2') the *relative* risk ratio refers to how its value after a *one unit increase in a given explanatory variable*, x_i, relates to its prior value according to:

$$4) \quad \frac{\exp(\boldsymbol{b}'_{m1} x_1 + \boldsymbol{b}'_{m2} x_2 + ... + \boldsymbol{b}'_{mi}(x_i +1) + ... + \boldsymbol{b}'_{mk} x_k)}{\exp(\boldsymbol{b}'_{m1} x_1 + \boldsymbol{b}'_{m2} x_2 + ... + \boldsymbol{b}'_{mi} x_i + ... + \boldsymbol{b}'_{mk} x_k)} = \exp(\boldsymbol{b}'_{mi})$$

The coefficients for main income category *m* in the regression output could thus be interpreted as the multiplier by which the ratio of the probabilities for source *m* and core sector main income changes, as a consequence of a one unit change in an explanatory variable.