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Determinants of Income Mobility and Household Poverty Dynamics in South Africa

INGRID WOOLARD and STEPHAN KLASEN

This article analyses household income mobility among Africans in South Africa's most populous province, KwaZulu-Natal, between 1993 and 1998. Compared to industrialised and most developing countries, mobility has been quite high, as might have been expected after the transition in South Africa. This finding is robust when measurement error is controlled for. When disaggregating the sources of mobility, it is found that demographic changes and employment changes account for most of the mobility observed which is related to rapidly shifting household boundaries and a very volatile labour market in an environment of high unemployment. Using a multivariate analysis, it can be seen that transitory incomes play a large role. Four types of poverty traps are found, associated with large initial household size, poor initial education, poor initial asset endowment and poor initial employment access that dominate the otherwise observed regression towards the mean.

I. INTRODUCTION

As an upper middle income country with a per capita GNP of $3,020 in 2000, South Africa fares extremely poorly on international comparisons of poverty and other social indicators [*World Bank, 2001; Klasen, 2002*]. Much of this poor record is related to the legacy of apartheid which produced very high inequality in South Africa. South Africa's Gini coefficient of 0.60 is among the highest anywhere in the world [*Klasen, 2002*]. Reducing poverty and

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inequality are consequently obvious areas of concern for policy makers in the post-apartheid governments.

An issue that is less discussed is inter-temporal income mobility – who is getting ahead, who is falling behind, who is standing still, and why? This is of particular relevance in the South African context for two reasons. First, because the post-apartheid government promised to reduce poverty and racial disparities it implies that they were aiming to increase mobility in the process, with particular emphasis on enabling upward mobility of previously marginalised Africans [*Government of South Africa, 1994*]. Policies explicitly aimed at generating such upward mobility of Africans were affirmative action legislation, racial equalisation and expansion of education spending, the expansion of a social safety net for Africans including the introduction of a child maintenance grant for the poor, greater labour market protection for low-skilled workers, a land reform programme for rural poor and a housing subsidy for poor urban dwellers, expansion of water supply, electricity and other infrastructure to previously under-served areas, and a macroeconomic reform package that was to deliver faster growth with redistribution.[1] To what extent these policies have succeeded so far and which groups of Africans appear to have benefited the most are questions that deserve closer scrutiny.

A second reason to study mobility is related to the government's policies to reduce poverty and vulnerability. Here the government was concerned about increasing the level and reducing the variability of incomes of the poorest South Africans. In particular, it adopted policies that were aimed at reducing the dependence of poor people's wellbeing on the vagaries of the labour market as well as demographic and other shocks.[2] Consequently, the importance of demographic and economic events on mobility should be carefully examined. Given the fluidity of household boundaries in South Africa that are affected by a variety of demographic changes as well as prevailing high unemployment, demographic events and employment changes can be expected to play a significant role in accounting for mobility in South Africa [*Case and Deaton, 1998; Klasen and Woolard, 2001*].

Here a framework developed for studying earnings mobility [*see for example Lillard and Willis, 1978; Gottschalk, 1982*] is applied to equivalised household incomes to measure the degree of mobility observed between 1993 and 1998 for African households in KwaZulu-Natal, South Africa's most populous province. This article focuses on the 1,003 African households in the KwaZulu-Natal Income Dynamics Study (KIDS) which collected follow-up data on households in KwaZulu-Natal that had previously formed part of the 1993 Project for Statistics on Living Standards and Development (PSLSD) survey.

Given that we only have two observations per household, measurement error might well influence the results. Consequently, a variety of procedures

are used to test and, as far as possible, correct for measurement error and examine the robustness of results. Controls for measurement error do not necessarily provide unbiased estimates but will help to get a sense of the magnitude of possible biases and thus the robustness of results, a strategy suggested, among others, by Bound, Brown, and Mathiowetz [*2001*].

II ANALYTICAL ISSUES AND FINDINGS

In contrast to the voluminous theoretical and applied income inequality literature, the literature on the measurement and interpretation of mobility is more limited and generally more ad hoc [*Fields and Ok, 1999*]. Important distinctions are made between relative and absolute mobility. The former examines changes in rank of households between two periods and is thus mainly concerned with the ability of individuals to move up (and down) in the rankings of incomes while the latter examines absolute changes in income between two periods and thus is additionally concerned with changes in absolute wellbeing (and poverty). For these reasons, both will be reported on in this article with the regression analysis being focused on absolute mobility as this conveys information on changes in rank as well as on the dynamics of poverty.

As far as measures of mobility are concerned, one first needs to distinguish between what Cowell and Schluter [*1998b*] call single-stage and two-stage indices. Single-stage indices consider the entire distribution in both years and examine mobility using that entire distribution, while two-stage indices first allocate individuals to income groups (either exogenously fixed income groups or endogenously determined ones like quintiles) and then examine mobility between these groups. Examples of single-stage indices are the correlation coefficient of incomes between two periods, Shorrock's rigidity index, Fields and Ok's measures, and King's measure [*Fields, 2001; Cowell and Schluter, 1998a*].[3] They have the advantage of using all available information inherent in the actual distributions and thus give the most comprehensive assessment of mobility. They have the disadvantage, however, of being particularly sensitive to measurement error which is a particular problem when data from only two waves are available, as is the case here. The index which, in simulation studies, was least sensitive is Shorrock's rigidity index using the Gini coefficient [*Cowell and Schluter, 1998a*] which compares the Gini of the total income in the two periods ($G(x + y)$) with the weighted average of the Gini in each period. It is defined as:

$$R = \frac{G(x+y)}{(\mu_x G_x + \mu_y G_y)/(\mu_x + \mu_y)}$$

where G_x refers to the Gini and μ_x to mean income in the first period. A value of one would mean no mobility at all, while 0 would indicate perfect mobility. This measure will be used to compare the results of this study with that of other studies.

Regarding two-stage indices, the most commonly used measure is the transition matrix and indices derived from it. For a transition matrix, the data are divided into *n* equally sized income classes (for example, deciles or quintiles) which are endogenously determined for each year. Let *P* be a matrix of *n* x *n* transitions, the *ij*-th element of which, P_{ij}, is the percentage in the income class *i* at time t_0 of those who at time t_1 were in class *j*. The units which moved from one income class to another ($i \neq j$) between time t_0 and time t_1 will be referred to as 'mobiles'. Those who remain in their original income class will be called 'immobiles'. Mobiles who experienced a positive change in relative wellbeing ($i < j$) will be referred to as 'winners' as opposed to 'losers' ($i > j$).

While sometimes the brackets of a transition matrix are exogenously fixed income classes, the more common method are endogenously determined income groups based on quintiles of the distribution in a given year (such as quintiles or deciles). The advantage of the transition matrix is that it can nicely summarise mobility at various points in the distribution which is harder to gauge from a single index. It also turns out to be more robust to measurement error [*Cowell and Schluter, 1998a*]. There are serious costs as well, including the disregard of important information, such as income changes within a bracket and the different absolute income changes that underlie a change in income bracket [*Fields and Ok, 1999*].[4]

Lastly, there is the question of the appropriate income concept for mobility analyses, in particular the choice between incomes and expenditures. The case for incomes is that this is the only way one can analyse sources of mobility (particularly in order to distinguish between demographic and economic events) which is an important part of this analysis. Moreover, in some contexts income might actually be more accurately reported than expenditures or the latter are not readily available [*Fields et al. 2003a; Glewwe, Gragnolati and Zaman 2002*]. On the other hand expenditures are typically a better guide to longer-term wellbeing of the household (or its 'permanent income') as household will exercise some consumption smoothing and use savings and dissavings to deal with erratic incomes [*Deaton, 1997*]. If one is interested in mobility in these longer-term incomes, expenditures are clearly preferred. Moreover expenditures might, in most cases, be more accurately captured, particularly among the poor who have relatively constant and well-known expenditures on relatively few items while their incomes can be very erratic und unpredictable [*Ravallion, 1992; Deaton, 1997; Klasen, 2000*]. We have access to income and expenditure

data and will use both, thereby also pointing to the differences between them which give some indication on the importance of transitory income shocks as well as measurement error issues.

There are relatively few studies on income mobility in developing countries and even fewer that are roughly comparable. This is partly due to the paucity of reliable panel datasets although increasing numbers of such datasets are becoming available.[5] Unfortunately, many of these panels have very few waves where issues of measurement error are particularly pertinent [*Deaton, 1997*]. Moreover most analyses focus, for obvious reasons, particularly on poverty dynamics rather than on household income mobility more generally [*for example Jalan and Ravallion, 2000; Dercon and Krishnan, 2000; Scott, 2000; Justino and Lichfield, 2002; McCulloch and Calandrino, 2002*].

The studies that exist generally suggest that income mobility in developing countries is higher than in industrialised countries, particularly at the bottom end of the distribution [*for example Dercon and Krishnan, 2000; Fields, 2001*]. They also seem to suggest increasing mobility over time in most places. Panel data from Peru based on expenditures points to increased mobility in the 1990s [*Fields, 2001*]. Data from rural China point towards rapidly increasing mobility from very low levels in the 1980s [*Nee, 1994*] and generally very high mobility at the low end of the distribution [*McCulloch and Calandrino, 2002*]. These studies as well as studies from Chile and Malaysia suggest that education, changes in employment and the demographic composition of the household play a large role in explaining existing mobility and in distinguishing between the transient and the chronic poor [*Fields, 2001*].

To the best of our knowledge, there are three studies that examine income mobility in South Africa using the same dataset. The focus of Carter and May [*2001*] is on movements into and out of poverty in relation to the asset base of the poor, asset and entitlement shocks. They exclusively rely on expenditure data and use transition matrices with exogenously fixed boundaries. They find considerable mobility between 1993 and 1998 and attempt to distinguish between structural and stochastic causes for this mobility.[6] This study differs by analysing overall income mobility (but including movements into and out of poverty), the disaggregation of mobility into demographic and economic events, the use of income *and* expenditure information, and the thorough analysis of measurement error issues.

The second study, by Fields *et al*. [*2003a*], analyses household income dynamics in four countries, including South Africa using the KIDS data. The study uses only (per capita) household income and is focused on trying to determine whether there is convergence of household incomes between the two periods considered. In the South African context, such convergence is

found. In that context, it also examines the issue of measurement error and finds that this can have a significant influence on the measured convergence but is unlikely to overturn the sizeable convergence found in the South African data. The third study, also by Fields *et al*. [*2003b*] is a companion article to the above study which looks at the determinants of household income change and considers initial demographic and labour market conditions as well as their changes and finds that changes in the employment status of the household head as well as initial income have the largest impact on income changes.

This study differs from their comparative analysis by considering incomes *and* expenditures, by focusing on South Africa, by providing a thorough sensitivity analysis using different income concepts, by adjusting the welfare measure by household size and composition, by considering a larger set of covariates (with particular relevance to the South African situation) when examining determinants of income change, and by explicitly considering the possibility of poverty traps.

III. DATA AND MEASUREMENT ISSUES

The sample data used in this chapter consist of the 1,003 African households in KwaZulu-Natal (KZN) that had been interviewed in both the 1993 PSLSD and 1998 KIDS surveys.[7] Sample attrition between the two periods is surprisingly low: 85 per cent of Africans in rural areas and 90 per cent of Africans in urban areas who had participated in 1993 could be re-interviewed in 1998, despite the fact that the survey was not originally designed as a panel. Two types of attrition took place: households who were known to have moved away (40 per cent); and households for which there was no information (60 per cent). Maluccio, Thomas, and Haddad [*1999*] show that the former do not differ substantially from those that were traced while the latter had lower per capita expenditure in the first period than the households that were traced. It is *a priori* unclear to what extent this might bias mobility estimates.[8] Given the very low overall attrition, the bias should not be very large.[9]

KwaZulu-Natal (KZN) is South Africa's most populous of the nine provinces, containing about 20 per cent of South Africa's population. It also contains much of the social and racial stratification present in all of South Africa. In particular the province includes a wealthy metropolitan area (Durban) with poor shantytowns surrounding it, a poor and largely rural former homeland (KwaZulu) with high levels of unemployment and poverty. Poverty as well as inequality within the province appear to be relatively similar to the national level [*Leibbrandt and Woolard, 1999*]. Table 1 shows that Africans in KZN are comparable to Africans elsewhere, although the

TABLE 1
COMPARISONS OF SAMPLE WITH AFRICANS AND ALL RACES IN SOUTH AFRICA

	1993 Africans in KZN	1993 Africans	1993 all races	1998 Africans in KZN
Percentage of households in urban areas	21.9	37.1	34.7	22.6
Percentage of household in (former) homelands	84.3	56.1	40.1	87.3
Unemployment rate	49.3	38.2	29.8	44.7
Poverty rate (income)*	57.8	44.0	32.9	48.3
Mean adult equivalent income	246.60	392.07	823.72	410.52
Mean adult equivalent expenditure	305.51	401.55	719.80	281.56

* Poverty rate is based on R212 per adult equivalent in 1993 Rands.

share coming from former homelands is higher, as is the unemployment rate and the poverty rate in 1993. The table also shows that Africans in 1993 were doing much worse than other population groups (the mean income for all races is much higher than the African mean income) and that income poverty fell for Africans by some 14 percentage points while mean income rose considerably.[10]

The unit of analysis is the household and the income variable used is disposable equivalised net income using the following formula for dealing with economies of scale and adult equivalence, commonly used for poverty and welfare analysis in South Africa [*May, Carter and Posel, 1995; Roberts, 2001*]:

$$\text{Adult equivalent income AEY} = \frac{\text{Household income}}{(\text{Adults} + 0.5\ \text{children})^{0.9}} \qquad (1)$$

The expenditure variable uses the same adult equivalence procedure. Clearly, given the conceptual difficulties of identifying appropriate equivalence scales [*Deaton and Paxson 1998*], the choice of equivalence scales is, to some degree, a debatable assumption. The assumption used above gives relatively little weight to children, but implies relatively small economies of scale. Given that most large households contain many children, the two weighting parameters jointly imply considerable economies of scale. As the food share, for which economies of scale are typically very small, in poor South African households is considerable (around 50 per cent), we believe that these scales reflect the South African situation well. We also report on some sensitivity analyses below.

Both the expenditure and income variable used imputations either for missing data or for items where there is only an implied income stream, particularly the income stream one derives from living in one's own home (or living rent free in someone else's home). In the case of housing, these income

streams were imputed and added both on the expenditure side as well as on the income side. They make up 4 per cent of expenditures and 7 per cent of incomes in 1993 and 13 per cent of expenditures and 15.4 per cent of incomes in 1998. This rising share of imputations is somewhat worrying as it is unclear that the value of housing or the quality of housing stock rose that much in these five years. In addition, on the income side, quite a few missing income components were imputed, often using regression-based methods.[11]

Almost two-thirds (63 per cent) of the sample reported that household income had increased over the period, while only 39 per cent reported an increase in expenditures. Real median adult equivalent income for African households increased by 24 per cent over the five-year period, while median monthly expenditures fell by 21 per cent. While some of this discrepancy can be real and relates to the timing of the survey (seasonality and economic cycle), changes in perceptions of permanent incomes (and thus expenditures) and the large role of transitory incomes, this large discrepancy in levels and trends raises some questions about the reliability of the data.[12]

These discrepancies could also indicate that measurement error is significant. To address the issue of measurement error the following procedures are used:

(a) All analyses are replicated using incomes and expenditures to see to what extent the results differ. Given the large discrepancy between incomes and expenditures, this procedure alone should provide some bound on possible measurement error.
(b) The 1993 and 1998 labour income data were purged by specifying earnings regressions of hourly earnings on gender, location, industry, age, age square, education and throwing out all observations that are outside two standard deviations from the point estimate of this earnings regression. The earnings regressions have a good fit (adjusted R^2 around 0.5) and confirm the usual findings from the human capital literature (regressions available on request). Using this procedure, about 5 per cent of observations were eliminated.
(c) An instrumental variable approach was used to measure error. Using a regression of household adult equivalent income (and expenditure) on household size, demographic structure, average education, age of household head, female headship, location, land and other asset ownership, and the employment and unemployment situation of adults, household incomes in 1993 and 1998 were predicted and mobility assessed using these predicted incomes. Clearly quite a lot of true mobility are thereby thrown away that would not be captured by these regressions but this approach should give one a sense of the maximum extent to which measurement error affects incomes or expenditures.[13]

(d) The imputed parts of the income and expenditure aggregate were eliminated and then the analysis on the sample was performed without imputations on the presumption that imputations might be bringing in a fair amount of measurement error [*Jarvis and Jenkins, 1998*].[14]

IV. THE EXTENT OF HOUSEHOLD INCOME MOBILITY 1993–98

We begin by reporting Shorrock's rigidity index using the Gini coefficient for the various income concepts to get a feel for the data and the changes over time. The Ginis for the two years are presented as well as those for the average income and the rigidity index which is calculated using the formula above. Several items in Table 2 are noteworthy. First, there is a considerable difference between inequality when using income and expenditures. The expenditure Gini is much lower than the income Gini, a finding that appears to be the case in most countries [*for example Deininger and Squire, 1998*]. This is to be expected as consumption smoothing makes expenditure less erratic and thus less unequal and as recall error among respondents tends to be inequality-reducing when it comes to expenditures (the poor report it well, the rich forget items) while recall error is usually found to be inequality-enhancing when it comes to incomes (the rich tend to have more stable and predictable incomes than the poor whose income is more erratic and therefore often tends to be understated, for example Bound *et al*. [*2001*], Deaton [*1997*]).[15] The two measures do agree, however, on rising inequality among

TABLE 2
RIGIDITY INDEX USING THE GINI COEFFICIENT AND VARIOUS INCOME DEFINITIONS

	1993 Gini	1998 Gini	G (x + y)	Rigidity Index
Incomes				
Unpurged	0.460	0.549	0.461	0.895
Purged	0.461	0.545	0.458	0.894
W/out imputations	0.461	0.577	0.468	0.884
Predicted	0.414	0.398	0.367	0.907
Expenditures				
Unpurged	0.304	0.379	0.294	0.867
Purged	0.304	0.378	0.293	0.865
W/out imputations	0.292	0.364	0.272	0.842
Predicted	0.233	0.255	0.218	0.896

Note: The 'purged' data refer to the income and expenditure data where labour income was outside of two standard deviations from predictions based on a wage regression. 'Without imputations' drops implied income and expenditure streams associated with housing and drops observation where other incomes where imputed. 'Predicted' is based on the household income (expenditure) regression.

Africans between 1993 and 1998 which is to be expected given that the educated and upwardly mobile Africans are likely to benefit more quickly from the end of race-based restrictions (and affirmative action) than poor and uneducated rural dwellers [*Klasen, 2002; Carter and May, 2001*].

Second, the rigidity index for incomes and expenditures indicates a fairly high degree of mobility, when compared to mature industrialised countries where the rigidity index is usually around 0.95 or above for countries such as the US, the United Kingdom, Germany, or Sweden [*for example Jarvis and Jenkins, 1998; Eriksson and Pettersson, 2000*]. It is closer to countries undergoing rapidly structural change such as Spain in the 1990s, where it was estimated to be around 0.9 on a comparable basis [*Cantó, 2000*].

Third, while the various adjustments for presumed measurement error do affect the Gini coefficients considerably, particularly in the case of leaving out imputations for the income Gini and using predicted incomes for both income and expenditure Ginis, the rigidity index is scarcely affected by any of these adjustments, particularly on the income side.[16] This seems to suggest that to the extent there is measurement error in the data, it seems to be positively correlated across time and thus only has a muted impact on mobility, which was also, for example, found for longitudinal earnings data in the US [*Bound and Krueger, 1991; Bound et al., 1994; see also Fields et al., 2003a*].

Lastly, despite large differences in inequality between incomes and expenditures, the rigidity index is quite similar, although somewhat lower for expenditures. Thus, in the five years between 1993 and 1998, incomes and expenditures experienced the same, relatively high mobility pattern.[17]

While these statistics already tell us quite a lot, we want to unpack mobility beyond this one measure and thus turn to transition matrices for a more disaggregated look. The quintile mobility matrix in Table 3 shows the distribution of households by quintile for 1993 and 1998. (Quintiles are numbered from one for poorest to five for richest.) It can be seen that 56 per cent of households who were in the richest quintile in 1993 remained there in 1998 and another 23 per cent moved down just one quintile. Likewise, 34 per cent of those who began in the poorest quintile were still there five years later and another 25.5 per cent had moved up by just one quintile. It is immediately evident that there is less mobility in the top and bottom quintile than in the middle of the distribution. This is, however, unsurprising given that the bottom (top) quintile can only stay in the same quintile or move up (down); also, furthermore the income range that make up the quintile is much larger for the richest quintile where the right-hand tail is particularly large which is the reason why persistence in that group is particularly high.[18] These figures also suggest quite a high degree of income mobility among Africans in KwaZulu-Natal which is certainly higher than that observed in most

TABLE 3
QUINTILE MOBILITY MATRIX FOR AFRICAN HOUSEHOLDS IN KWAZULU-NATAL, 1993–98

(a) Using raw data

	Quintile in 1998					
1993 quintile	1	2	3	4	5	(row) total
1	33.2	24.3	18.2	14.4	9.9	100.0
2	32.6	28.2	18.8	13.8	6.6	100.0
3	17.8	21.7	28.3	23.3	8.9	100.0
4	10.5	19.9	23.8	26.5	19.3	100.0
5	6.1	6.1	10.5	22.1	55.3	100.0

(b) *Using data purged by outliers from wage regressions*

	Quintile in 1998					
1993 quintile	1	2	3	4	5	(row) total
1	34.3	26.0	18.8	14.4	6.6	100.0
2	32.6	29.3	18.8	14.4	5.0	100.0
3	17.2	24.4	30.0	20.6	7.8	100.0
4	11.1	15.5	23.8	33.7	16.0	100.0
5	5.0	5.0	8.3	17.1	64.6	100.0

Source: Own calculations on PSLSD/KIDS data.

industrialised countries [*for example Jarvis and Jenkins, 1997*], but also higher than in rural China between 1978 and 1983, Malaysia between 1967 and 1976, and Peru in the 1980s and 1990s [*Fields, 2001*]. It is quite similar, however, to rural China between 1983 and 1989 although the structure of mobility appears to be somewhat different.[19]

When purging the data of outliers based on earnings regressions, one gets more persistence and very large movements between income groups, particularly downward movements, are now reduced. For example, there are now fewer households that jumped up but particularly down two, three, or even four quintiles. As a result, one gets quite a lot more persistence, notably in the top quintile where the data now looks more like those of industrialised countries. At the bottom, however, mobility continues to be much higher than in industrialised countries.

When using expenditures, incomes without imputations, and predicted incomes or expenditures (see appendix for transition matrices), the general impression of high mobility is not changed considerably.[20] In particular, the mobility matrix based on expenditures is quite similar to the (raw) income mobility matrix. There are, however, some differences in the extent of estimated mobility. The *predicted* income and expenditures based on the instruments show, not surprisingly, less mobility, particularly at the bottom of

the distribution as the underlying household characteristics have not changed so much over the intervening five years. But this adjustment clearly exaggerates the extent of measurement error as any stochastic element in income determination is now eliminated although a good part of this stochastic variation is likely to be real rather than simply due to measurement error.[21] Thus the relatively high mobility observed appears to be real rather than simply a result of measurement error [*see also Fields et al., 2003a*].

V. THE DETERMINANTS OF WELFARE CHANGES: UNIVARIATE ANALYSES

According to identity (1), change in an individual's wellbeing arises through changes in household income (via the numerator) which is called economic events and/or changes in household composition (via the denominator) which is referred to as demographic events. This distinction between welfare changes as the result of *economic events* and *demographic events* is often not considered, but is of considerable relevance from a policy point of view. These economic events can be further broken down into economic events that relate to changes in income sources (for example, through changes in employment status, changes in sources of non-labour income) and changes in existing income sources.

Table 4 considers what is the biggest contributing 'event' associated with a movement into and out of poverty (where poverty is defined as

TABLE 4
MAIN EVENT ASSOCIATED WITH THE MOVEMENT OF A HOUSEHOLD *INTO* AND *OUT OF* POVERTY (PERCENTAGE OF HOUSEHOLDS)

	Into poverty	Out of poverty
Fall/rise in money income as result of:		
Demographic events	27.4	23.6
Income event, change in income from:		
Head losing/getting job	18.8	12.0
Fall/rise in head's labour earnings	6.0	4.8
Other family member losing/getting job	15.4	16.8
Fall/rise in other household members' labour earnings	5.1	8.7
Fall/rise in remittances	11.1	10.6
Fall/rise in non-labour income of head/spouse	5.1	6.7
Fall/rise in non-labour income of other household members	0.9	3.4
Fall/rise in self-employment income	3.4	9.6
Fall/rise in farm income	6.8	3.9
Total	100.0	100.0
Observations	129	223

Source: Own calculations on PSLSD/KIDS data.

having income of less than R212 per adult equivalent per month in 1993 terms[22]). Table 4 shows that more than one-quarter of households that moved into poverty did so because of a change in demographic composition. The vast majority of these households added a child, a grandchild or another dependent family member to the household. Nevertheless, the majority of households became poor because of a fall in income. Of those, nearly half of the households suffered falling incomes due to job losses. A significant number of households, however, fell into poverty because of a decline in remittance income, non-labour earnings (usually the loss of a state pension or grant), a change in earnings, or falling incomes from small-scale agriculture.

Regarding movements out of poverty, one-fifth of households escaped poverty as a result of shedding household members, the most important of which due to household members leaving home to start employment or education.[23] As in the case of movements into poverty, labour market changes were the most common reason for a significant change in household wellbeing. Again getting a job is much more important than changes in earnings (for those already working) for movements out of poverty. A significant proportion of households moved out of poverty because of an increase in state support or other non-labour income.

The results show some similarities to poverty dynamics in industrialised countries [*for example Jenkins and Rigg, 2001*]. For example, demographic events are also more important for getting into poverty than getting out, and employment and earnings of the head and the spouse are particularly important among the income events. But there are also important differences. In particular, employment changes rather than wages in a particular job are more important in South Africa, and there is greater importance of remittances and agricultural incomes for movements into and out of poverty.

Altogether, demographic events and employment changes account for more than 60 per cent of mobility into poverty, and over 50 per cent out of poverty. Clearly, rapidly shifting household dynamics and employment changes in a situation of mass unemployment are the biggest determinants of mobility in this economy. These assignments hardly change when purging the data of outliers and change only slightly when imputations are taken out (not shown here). In the latter case, the importance of demographic and employment events rises even further, to 63 per cent of movements into, and 55 per cent of movements out of poverty.

Besides studying events associated with movements into and out of poverty, we also analysed important univariate determinants of income gains and losses. This is done in detail in Woolard, Klasen and Leibbrandt [*2002*] and will be briefly summarised here. Consistent with the findings above, important correlates of moving ahead are shedding household members,

gaining employed people and losing unemployed people. More surprisingly, elderly household heads and female-headed households had a higher propensity to move ahead than middle-aged household heads or male-headed households. Households with elderly heads (including many households headed by female elderly) are heavily reliant on state support, particularly the non-contributory social pensions, which is not only a secure form of income, but has increased appreciably in real terms since 1993 [*Case and Deaton, 1998*].

While these univariate findings are suggestive, it is important to analyse the determinants of welfare changes in a multivariate setting, to which we presently turn.

VI. MODELLING DETERMINANTS OF WELFARE CHANGE: MULTIVARIATE ANALYSIS

In this section, an attempt is made to identify the factors which influence whether a household gained or lost over the five-year period between the first and second wave of the household survey.[24] The model that is proposed is derived directly from the standard household utility maximisation model with adult equivalent household income as a money metric measure of utility. The underlying assumption of this model is that household income is a function of household assets (both physical and human) and the economic environment in which these assets can be utilised to generate income. In addition, the wellbeing of individual household members will depend additionally on the number of people who have to share these assets and the incomes derived from them.

Consequently, the dependent variable in this model is change in the real adult equivalent income between 1993 and 1998.

A model of the following form was used:

$$\Delta \ln(AEY_i) = f(K_i, \Delta K_i; R_i; \Delta R_i)$$

where

AEY_i = real 'adult equivalent' income of household i
K_i = physical and human assets of household i
R_i = a set of characteristics which summarise the economic and demographic environment in which i operates and thus determines the returns to those assets a household possesses.

The regression was estimated separately for urban and rural households[25] and allowed for further segmentation through the use of dummy variables for the

gender of the household head and regional dummies for homeland/non-homeland households. In the urban regression a dummy for the Durban metropolitan area was also included.

Originally the model included income composition variables as proxies for a household's ability to respond to economic change since it has been argued that a diversified income base helps reduce household vulnerability to shocks [May *et al.,* 1995]. Since none of the variables were significant, they were dropped from the model. It was also attempted to include 'shock' variables identified by the household – such as the occurrence of a fire, crop loss or death – but none of these were significant.[26]

The first-difference variables include changes in human assets as well as demographic composition and employment changes as they might reasonably be seen as exogenous to the dependent variable.[27]

The initial income variable in the regression is a lagged endogenous variable which, given plausible assumptions about the correlation of errors (for example, positive correlation of errors over time in the reporting of incomes) will lead to biased estimates of the coefficients [*for example, Greene, 2000; Fields et al., 2003a; Forbes 2000*]. In addition, to the extent that a portion of the 1993 income is transitory, one will find a negative correlation between initial incomes and income change as households are reverting to their permanent income. As we are not so interested in these short-term fluctuations but more in medium-term mobility, we would ideally want to disregard these transitory income components. To address these issues, instrumental variable [IV] techniques will be used to predict initial incomes.[28] In choosing instruments, we are guided by Fields *et al*. [*2003a,b, 2003*] and rely particularly on headship and family characteristics as well as cluster average incomes (expenditures) for instruments. The instruments perform very well on the relevant tests,[29] but a Hausman test (comparing the IV regressions with OLS) never finds endogeneity to be a problem. As the results do differ for certain covariates the IV results will be discussed as well, but are not reported separately.[30]

Table 5 summarises the explanatory variables and shows their means and standard deviations. In the case of 'initial conditions' variables, the figures pertain to 1993, while the change variables were calculated by subtracting 1993 values from 1998 values. Note that the standard deviation of the expenditure variable in 1993 is considerably lower than that of the income variable, suggesting that as incomes go up, the average propensity to consume declines (see below).

Table 6 presents the results for the income change regressions run separately for rural and urban households. The models both fit very well, with the urban model explaining slightly more of the variation in the data than the rural model. Many of the initial conditions variables as well as of

TABLE 5
MEAN AND STANDARD DEVIATION OF VARIABLES USED IN MODEL

	Urban households		Rural households	
	Mean	Std dev.	Mean	Std dev.
Income variables				
Change in ln (adult equivalent income)	0.48	1.02	0.26	1.18
Ln adult equivalent income 1993	5.53	0.94	4.98	0.95
Change in ln (adult equivalent expenditure)	0.005	0.68	− 0.26	0.68
Ln (adult equivalent expenditure)	5.74	0.56	5.51	0.57
Human capital variables				
Household size	7.09	3.38	8.13	4.07
Share of children in household	0.35	0.20	0.40	0.20
Share of female adults (under 60) in household*	0.32	0.17	0.28	0.16
Share of male adults (under 65) in household*	0.27	0.19	0.25	0.17
Average years of education of those not in school	6.17	2.53	3.70	2.65
Age of household head	52.25	14.09	52.80	14.44
Segmentation variables				
Female headed households (1 = female headed, 0 otherwise)	0.42	0.49	0.33	0.47
Homeland (1 = former KwaZulu, 0 otherwise)	0.71	0.45	0.92	0.27
Durban (1 = Durban metropole, 0 otherwise)	0.38	0.49		
Physical capital variables				
Home owner (1 = home-owner, 0 otherwise)	0.83	0.38	0.92	0.27
Number of durables owned by household	4.81	2.91	3.07	2.29
Grazing or farming rights (1 = rights, 0 otherwise)	0.02	0.12	0.60	0.49
Labour market variables				
Share of persons in household with jobs	0.32	0.26	0.24	0.30
Share of unemployed persons in household	0.26	0.27	0.19	0.24
Change variables between 1993 and 1998				
Change in household size	− 0.32	2.60	− 1.02	3.40
Change from male to female household head	0.10	0.30	0.12	0.32
Change in the share of children in household	− 0.020	0.20	0.010	0.22

(*continued*)

TABLE 5 (*cont'd*)

	Urban households		Rural households	
	Mean	Std dev.	Mean	Std dev.
Change in the share of female adults in household	0.007	0.17	0.009	0.18
Change in the share of male adults in household	0.001	0.18	− 0.033	0.20
Change in the average years of education	0.32	2.41	0.47	2.34
Change in share of persons in household with jobs	0.22	0.37	0.32	0.35
Change in share of unemployed persons in household	− 0.05	0.34	0.01	0.30
N	191		656	

Source: Own calculations on PSLSD/KIDS data. *Different cut-offs are chosen for male and female elderly as the eligibility for the fairly generous non-contributory pensions follow these age cut-offs.

the change variables have a significant impact on income change, a finding not replicated in many other countries.[31] In both models, 1993 income has a negative coefficient, suggesting a strong tendency towards the mean (or convergence of adult equivalent incomes). Thus the higher adult equivalent income was in 1993, the more likely the household was to experience a drop in welfare over the five-year period. This suggests that there are large transitory components in the income of most households, which is consistent with the picture of high mobility which was presented above. It would also be consistent with typical findings about measurement error which also tend to produce regression towards the mean [*Bound et al., 2001*]; this issue is further examined below.

Among the human capital and household composition variables, we find that large initial household sizes reduce adult equivalent income in urban and rural areas. This suggests that large households have greater difficulty in improving their economic position.[32] Household composition affects mobility differently in rural and urban areas. A large share of children in rural areas, and increases in that share in both rural and urban areas lead to falling income levels. Thus, it appears that the prospects are particularly poor if household size is large due to presence of many children. In urban areas, a high share of female and male adults improves prospects for positive income change, and only an increase in the number of children significantly reduces these prospects. Both findings are quite intuitive. In rural areas, however, only a large share of elderly in 1993 (the omitted category) greatly improves the chance of increasing incomes, while an increase in the share of children reduces it. This points to the great importance of old-age pensions as an

TABLE 6 DETERMINANTS OF CHANGE IN LN (ADULT EQUIVALENT INCOME)

	Urban households		Rural households	
Adjusted R^2	0.68		0.55	
Number of observations	191		656	
	Coefficient	Std error	Coefficient	Std error
Intercept	**2.93*****	1.13	**4.63*****	0.67
Income variable *ln (adult equivalent income 1993)*	− **0.84*****	0.06	− **0.95*****	0.04
Human capital variables				
Household size	− **0.04****	0.01	− **0.02****	0.01
Share of children in household	0.19	0.70	− **1.49*****	0.37
Share of female adults (under 60) in household*	**1.06***	0.62	− **1.32*****	0.36
Share of male adults (under 65) in household*	**1.11***	0.77	− **0.67****	0.35
Average years of education of those not in school	**0.12*****	0.02	**0.12*****	0.02
Age of household head	0.001	0.02	0.001	0.01
Squared age of household head	0.0001	0.0002	0.0001	0.0001
Segmentation variables				
Female headed households (1 = female headed, 0 otherwise)	− **0.19***	0.11	− **0.24*****	0.08
Homeland (1 = former KwaZulu, 0 otherwise)	0.07	0.10	**0.36*****	0.13
Durban (1 = Durban metropole, 0 otherwise)	**0.18****	0.10		
Physical capital variables				
Home owner (1 = home-owner, 0 otherwise)	− 0.07	0.11	0.07	0.13
Number of durables owned by household	**0.05*****	0.01	**0.04****	0.02
Grazing or farming rights (1 = rights, 0 otherwise)	0.27	0.20	0.06	0.08
Labour market variables				
Share of persons in household with jobs	**1.00*****	0.26	**1.15*****	0.21
Share of unemployed persons in household	− 0.51	0.42	**0.86*****	0.21
Change variables between 1993 and 1998				
Change in household size	− 0.01	0.02	0.01	0.01
Change from male to female head	− **0.41****	0.20	− **0.33*****	0.09
Change in the share of children in household	− **0.81*****-	0.30	− **0.84*****	0.23
Change in the share of female adults in household	0.22	0.38	**0.42***	0.30

(*continued*)

TABLE 6 (*cont'd*)

	Urban households		Rural households	
Change in the share of male adults in household	**0.85****	0.37	0.19	0.30
Change in the average years of education	**0.12*****	0.02	**0.12*****	0.02
Change in share of persons in household with jobs	**1.00*****	0.26	**0.88*****	0.17
Change in share of unemployed persons in household	**− 0.57****	0.29	**− 0.90*****	0.19

Source: Own calculations on PSLSD/KIDS data.
Note: Coefficients in bold are significant. Those denoted with * are significant at a 10 per cent level, with ** at a 5 per cent level, and with *** at the 1 per cent level (one-tail test). We choose different cut-offs for male and female elderly as the eligibility for the fairly generous non-contributory pensions follow these age cut-offs. Left-out categories are the share of elderly and the change in the share of elderly.

income source in rural areas, while the presence of adult males is not very important due to poor employment opportunities there.

Thus, we find that large households with many children are facing a situation that one could call a demographic poverty trap in the sense of making it more difficult for large households to escape poverty.[33]

High *initial* education and *change* in education significantly improves upward mobility in both urban and rural areas. This represents evidence of a second poverty trap, this time associated with education. While improving education is a way out of poverty, those who started with low education will have an additional hurdle to overcome.

Regarding physical assets, the number of durables owned in the initial period has a significant positive impact on subsequent income change. Those with poor household assets have greater difficulty in improving their incomes, thus representing a third poverty trap.[34]

Turning to the segmentation variables, homeland households increased their wellbeing by more than their non-homeland counterparts. After controlling for all other factors, female headed households fare worse than male-headed households in both urban and rural areas. Thus, the univariate finding of female-headed households improving their situation more often than male-headed households does not carry over to the multivariate analysis. Moreover, a change from a male-headed to a female-headed household is associated with a fall in income in both urban and rural areas. This fact might be due to the uncertain nature of remittances sent by absent heads as well as the impact of a male head having passed away. The age of the household head was also not significant.

The employment variables came in very strongly, with large and significant coefficients. Both the initial state variables and the change variables were important predictors of change in welfare. While the change variables are eminently plausible, the initial conditions variables are more worrying. They suggest that households with few initially employed members and large numbers of unemployed are finding it more difficult to improve their incomes subsequently. This points to a fourth poverty trap, this time associated with the labour market, suggesting significant segmentation and disadvantages for those from households with little labour market experience. Interestingly, the effect of an additional employed person more than compensates for the acquisition of an unemployed person.[35] The coefficient of the share of persons with jobs in 1993 is about the same size as the coefficient of an increase in these shares, which is surprising given that what is being modelled is the *change* in welfare.

It is particularly worrying to see four types of poverty traps emerging separately in this multivariate framework. Many households might be subject

to all four of these traps at the same time as they have a large household, poor asset base, poor average education, and a low share of employed and a high share of unemployed in 1993. Conversely, the great importance and significance of the change variables point to the possibility of poor households escaping poverty. The most important factors that help are improvements in education and employment, and a reduced number of children.

Also here, alternative specifications are considered to check to what extent these results might be driven by measurement error. When the purged income dataset is used (not shown here), the changes are minute and virtually identical to the ones reported above. The purged regressions do have a slightly better fit, as one would expect. The regression towards the mean is, surprisingly, larger than previously suggesting that measurement error is not so much behind this.

When using the expenditure regressions (Table 7), the results are similar to the income regressions. This result is surprising given that there were significant differences in levels and trends to the income variables. In particular, there is a similarly strong negative effect of initial expenditures, suggesting strong regression towards the mean. This indicates that, although expenditures vary less than incomes in each year (see Table 5), they vary by not much less than incomes over time, suggesting that households are not able to smooth consumption very successfully. Moreover, we also find the four poverty traps associated with having a large household,[36] having few assets, being poorly educated, and having few employed people in the household in the initial period. The employment variables are less important in general in the expenditure regressions, confirming what was found in Woolard *et al*. [*2002*]. In contrast, the household size and change in household size effect is larger and more significant in urban and rural areas. Regarding the change variables, improvements in education, reducing household size and reducing the share of unemployed are associated with improvements in expenditures.[37]

The income regressions without imputations are also considered (not shown but available on request). The results are qualitatively very similar again. Strong regression towards the mean is found, poverty traps associated with poor education and initial employment are also found. The trap associated with household size is not significant in rural areas and in general the model has a worse fit.

Lastly, the three types of models were analysed using an instrumented initial income variable. In the income change regression, they actually have little impact on any of the coefficients, except that many are now not as well determined and therefore less significant.[38] In the expenditure

TABLE 7
DETERMINANTS OF CHANGE IN LN (ADULT EQUIVALENT EXPENDITURES)

	Urban households		Rural households	
Adjusted R^2	0.54		0.47	
Number of observations	192		657	
	Coefficient	Std error	Coefficient	Std error
Intercept	**6.23*****	0.88	**4.17*****	0.41
Income				
ln (adult equivalent expenditures 1993)	− **1.03*****	0.09	− **0.86*****	0.04
Human capital variables				
Household size	− **0.08*****	0.01	− **0.05*****	0.01
Share of children in household	− **0.80**	0.53	− 0.24	0.25
Share of female adults (under 60) in household*	− **0.67****	0.35	− **0.79*****	0.26
Share of male adults (under 65) in household*	− **1.07****	0.43	− 0.21	0.26
Average years of education of those not in school	**0.07*****	0.02	**0.08*****	0.01
Age of household head	0.01	0.01	− 0.001	0.01
Squared age of household head	− **0.0001***	0.0001	0.00005	0.0001
Segmentation variables				
Female headed household in 1993 (1 = female headed, 0 otherwise)	− 0.07	0.09	− **0.10****	0.05
Homeland (1 = former KwaZulu, 0 otherwise)	0.02	0.18	− 0.05	0.10
Durban (1 = metropole, 0 otherwise)	0.13	0.14		
Physical capital variables				
Home owner (1 = home-owner, 0 otherwise)	0.09	0.09	**0.20*****	0.07
Number of durables owned by household	**0.07**	0.01	**0.04*****	0.01
Grazing or farming rights (1 = rights, 0 otherwise)	0.07	0.13	**0.10****	0.05
Labour market variables				
Number of persons in household with jobs	0.24	0.20	**0.39*****	0.12
Number of unemployed persons in household	− **0.38**	0.19	− **0.52*****	0.11
Change variables between 1993 and 1998				
Change in household size	− **0.08**	0.02	− **0.03*****	0.01

(*continued*)

TABLE 7 (*cont'd*)

	Urban households		Rural households	
Change from male to female head	−0.10	0.15	**−0.16*** **	0.06
Change in the share of children in household	0.17	0.26	0.08	0.17
Change in the share of female adults in household	−0.11	0.33	**0.24***	0.16
Change in the share of male adults in household	0.31	0.41	0.01	0.17
Change in the average years of education	**0.05**	0.03	**0.07*** **	0.01
Change in share of persons in household with jobs	0.14	0.15	**0.41*** **	0.11
Change in share of unemployed persons in household	**−0.32**	0.13	**−0.37*** **	0.09

Source: Own calculations on PSLSD/KIDS data.
Note: Coefficients in bold are significant. Those denoted with * are significant at a 10 per cent level, with ** at a 5 per cent level, and with *** at the 1 per cent level (one-tail test). *Different cut-offs were chosen for male and female elderly as the eligibility for the fairly generous non-contributory pensions follow these age cut-offs. Left-out categories are the share of elderly and the change in the share of elderly.

change regression, all four poverty traps remain significant. While the regression towards the mean is not changed much in urban areas, it is significantly reduced in rural areas. In the income regression without imputations, the results are also not much affected by the use of instrumental variables.

The results suggest, quite robustly, that transitory incomes play a large role in determining household welfare. Those found to be poor in the initial period are likely, on average, to improve their income position significantly. Conversely, there are four types of poverty traps associated with poor initial education, assets, employment, and large household size. Which effect is, on average, stronger? Table 8 tries to address this question. At the mean, it evaluates the impact of a simultaneous deterioration of one standard deviation of the initial income variable, as well as the four variables associated with the poverty traps. In the first column, it thus asks by how much a mean household's adult equivalent income will change between 1993 and 1998 if initial income, number of durables, education, and the share of jobs is each reduced by one standard deviation, while the initial household size and share of unemployed is increased by one standard deviation. This is done for the three income concepts, urban and rural households, and also an instrumental variable (IV) regression that instruments for initial income. The positive impact of lowering initial income on income change is substantial, but it is invariably dominated by the negative impact of poorer initial education, assets, employment, and household size. At the mean, this change would reduce incomes by about 12–14 per cent in rural and urban areas, where poor initial education and employment are quantitatively most important. Changing to the IV regression hardly changes the results in urban areas, but reduces the convergence effect as well as the size of the poverty traps in rural areas. Using the expenditure regressions, the negative impact of the poverty traps is also larger than the convergence effect as the impact of the combined simulation would lower adult equivalent expenditures by between 15–20 per cent. The convergence effect is much smaller (due to the reduced standard deviation in expenditures observed in Table 5), and the household size poverty trap is quantitatively much larger. These results suggest that, regardless of the specification and the control for endogeneity, the impact of poor initial conditions is larger than the benefit of regression towards the mean.[39]

One should also point out that these results reflect average effects. It may well be the case that some households are transitorily poor and therefore experience rapid regression towards the mean and no poverty traps, while others are chronically poor, trapped by the four poverty traps discussed. Also, these effects may differ at different parts of the distribution which merits further investigation.[40]

TABLE 8
CONVERGENCE VERSUS POVERTY TRAPS

	Urban				Rural			
	Income	Income instr.	Expend.	Income w/o imp.	Income	Income instr.	Expend.	Income w/o imp.
Initial income	0.79***	0.86***	0.58***	0.70***	0.90***	0.62***	0.49***	0.81***
Household size	− 0.12**	− 0.13*	− 0.25***	− 0.16**	− 0.07**	− 0.04	− 0.19***	− 0.03
Durables	− 0.13***	− 0.14*	− 0.19***	− 0.16***	− 0.09**	− 0.04	− 0.10***	− 0.08*
Education	− 0.29***	− 0.31***	− 0.18***	− 0.27***	− 0.32***	− 0.26***	− 0.22***	− 0.24***
Share employed	− 0.26***	− 0.29**	− 0.06	− 0.21**	− 0.34***	− 0.26***	− 0.12***	− 0.41***
Share unemployed	− 0.14	− 0.16	− 0.10**	0.03	− 0.20***	− 0.12	− 0.09***	− 0.20***
Total	− 0.15	− 0.16	− 0.21	− 0.08	− 0.12	− 0.09	− 0.23	− 0.16
Change at mean	− 34.55	− 37.75	− 57.95	− 16.07	− 16.88	− 12.92	− 50.21	− 20.35
Percentage change	− 13.8	− 15.0	− 18.6	− 7.5	− 11.7	− 8.9	− 20.3	− 14.5

Note: The table compares the impact of a standard deviation deterioration in the stated 1993 covariates on the change in per adult equivalent income (or expenditure or income without imputations) between 1993 and 1998. Deterioration means a simultaneous increase in household size and in the share of unemployed and a decrease in the average education, employment shares, durable goods, and initial income. The last two rows then evaluate the combined impact, evaluated at mean income in 1993, in absolute and relative terms. * refers to 10 per cent significance level, ** to a 5 per cent significance level, and *** to a 1 per cent significance level (one-tailed test).

VII. CONCLUDING COMMENTS

In this article the determinants of household income mobility among Africans in South Africa's most populous province of KwaZulu Natal between 1993 and 1998 were examined. A fairly high degree of mobility was found, compared to industrialised and also most developing countries. Part of this mobility might be spurious and due to measurement error, but various attempts to correct for this problem do not drastically alter the impression of high mobility. When disaggregating the observed mobility, it was found that demographic changes and employment changes are the most important determinants of mobility. Both are related to high unemployment and a resulting great deal of labour market churning as well as to great demographic fluidity which is related both to fertility and mortality, but also to shifting household boundaries. The multivariate analysis confirms the importance of demographic and employment effects. Apart from a strong tendency of a regression towards the mean, which should facilitate mobility also for the poor, four poverty traps were identified that hinder the advancement of the poor. They relate to large initial household size, poor initial assets, poor initial education, and poor initial participation in the labour market. These poverty traps appear to quantitatively dominate the effect of the regression towards the mean. Conversely, improvements in education, reductions in household size (particularly in the number of children), and improved employment opportunities appear to be the most promising ways to improve incomes.[41] Overcoming the poverty traps and strengthening the factors associated with improved incomes will be the main challenges facing policy-makers in their efforts to combat poverty.

NOTES

1 See *Klasen*, [*2002*] for a discussion of these policies.
2 Among these are the generous old age (social) pensions of the government, public works programmes, disaster relief, child grants and disability grants.
3 For a careful discussion of the axioms of these measures and their inter-relationships, see Fields and Ok [*1999*] and Fields [*2001*].
4 This last point can be important in international comparisons of mobility. In a country with low inequality, the same transition matrix may mean much smaller changes in absolute income levels compared to a country with very high inequality. To the extent one wants to capture these absolute changes as well, a transition matrix may not be the right tool. Despite these problems, the advantages of transition matrices are considerable. The choice of income groups in these transition matrices is largely arbitrary and, in general, tends to take the form prevalent in the literature to allow for the comparison of results. The most popular choices seem to be quintiles and deciles. Nevertheless, the choice of groups influences the results. The smaller (in terms of income range) the brackets, the more likely that people will move between brackets and thus mobility will appear larger. Thus, using deciles usually will generate higher perceived mobility than quintiles. Here we selected quintiles rather than deciles because the dataset is quite small.

5 See for example, the special issue of the *Journal of Development Studies* in August 2000 which includes articles on a number of panel datasets as well as Fields *et al.* [*2003a*].
6 Structurally poor are people whose predicted incomes are below the poverty line, while stochastically poor are people whose predicted incomes are above the poverty line but who experienced a negative stochastic shock. It is unclear to what extent one can distinguish these stochastic elements because of measurement error problems. Also, by relying exclusively on expenditures, they do not address the problems and issues of inconsistency between expenditures and incomes in the two years (see below).
7 For detailed information on the dataset, refer to May, Carter, Haddad, and Malluccio [*2000*]. The survey also included a smaller number of Asian households which we do not analyse in this article. Unfortunately, the whites interviewed in 1993 were not interviewed again in 1998 due to a small and unrepresentative sample.
8 If their households were doing particularly poorly and this is the reason for their disappearance from the dataset (as is often the case in such panel settings), then this might slightly overestimate mobility and thus underestimate the impact of poverty traps we identify later on. But since we are speaking at most of 7 per cent of households, the likely bias is small.
9 The re-survey also showed that a few households in 1993 never existed, but are suspected to have been invented by the enumerators. Subsequent qualitative work suggests that entire communities had been fabricated in both 1993 and 1998. As a result, a total of six clusters have been dropped from the sample. This has significantly reduced the urban African sample to only 198 households.
10 Using expenditure data, poverty is believed to have risen (see below and Carter and May [*2001*]).
11 They make up another 3 per cent of income in 1998 and 1 per cent of expenditures.
12 There is reason to believe that the expenditure figures in 1998 are somewhat understated. The income figures in 1993 were similarly understated which can contribute to this converse movement in these aggregates. In particular, the 1998 income and expenditure figures seem to tally very well, while the 1993 figures do not. In 1993, expenditures exceeded incomes by more then 20 per cent in 40 per cent of households, which seems too high even when considering income smoothing and suggests that incomes were not completely listed. Similarly, in 1998 the list of expenditure items solicited in the questionnaire was reduced in some categories. In addition, median and mean food spending is reported to have declined by nearly 40 per cent between 1993 and 1998 which seems unlikely given the high poverty and large food shares of households and points to under-reporting in 1998. Thus, understated incomes in 1993 may mean that income growth was smaller than reported and understated expenditures in 1998 might mean that the expenditure decline was smaller, explaining part of the discrepancy converge. It is all the more important to address issues of measurement error.
13 Carter and May [*2001*] interpreted these differences between predicted and actual incomes (in a slightly different regression framework using expenditures) in their entirety as stochastic elements of income that can make households stochastically poor or non-poor. Instead of using predicted incomes for each year, we also ran a fixed effects regression based on the pooled data for both years. Due to the great importance of the fixed effects, using this regression (predicted) mobility was greatly reduced to levels that did not seem plausible. Given the changing nature of households, it was also not clear whether such a fixed effects approach was warranted.
14 In particular, we drop observations with imputed incomes and subtract imputed housing services from both expenditures and incomes, but retain these observations without the imputations. Please note that we use this procedure in addition to purging outliers based on the wage regressions.
15 This is particularly the case when many of the rich derive most of their income from employment, rather than capital incomes.
16 It is somewhat more affected on the expenditure side, but here too only the predicted expenditures really have a significant effect.
17 One may wonder how this is consistent with the lower Gini reported for expenditures in each year and the presumption that consumption smoothing makes expenditures less erratic and

unequal. It may be the case that over the medium-term horizon of five years, (presumed) permanent incomes have changed as much, or possibly even more than actual incomes and thus are reflected in the relatively high mobility in expenditures.

18 While in the lower four quintiles, the income brackets cover a range of 90–400 Rand in monthly adult equivalent incomes, the top quintile ranges from 792 to 11,300 Rand. Clearly, it is harder to leave this much larger bracket than the lower ones.

19 In rural China, (downward) mobility from the top quintile is higher than in South Africa. This may partly be due to the fact that overall income inequality in rural areas was much lower to begin with so that the income change required to change income bracket is smaller than in South Africa.

20 See also Maluccio, Haddad, and May [*2000*] and Roberts [*2001*] who also report a transition matrix based on per capita expenditures using the same data.

21 Carter and May [*2001*] assume that the stochastic variation of expenditures is *all* real which seems equally implausible as some measurement error is likely to play a role. Conversely, the transition matrix without imputations suggests the highest mobility of all estimates including considerable mobility across two, three, or even four quintiles, but here it is equally unclear whether this might be due to additional measurement error introduced by subtracting the housing income imputations.

22 This is a poverty line that is chosen so as to make the poorest 40 per cent of households 'poor' in 1993, and this line was held fixed in real terms. Often there may be more than one event that changed adult equivalent income. In this case, only the biggest one is recorded which is the one that had the largest percentage change in adult equivalent incomes. This we implement by first checking whether a demographic or an economic event had the biggest impact adult equivalent incomes. If it was an economic event, we then further examine which economic event has the largest impact on adult equivalent incomes.

23 Also, about a third of the households shedding members did so because of a death of a member most of which had previously been a dependent (young or old).

24 For a similar type of analysis for Cote d'Ivoire, see Grootaert and Kanbur [*1990, 1995*].

25 The definition of urban and rural was partly driven by previous apartheid-era classifications. In particular, some of the 'rural' areas might be relatively densely populated former homelands.

26 See Maluccio, Haddad, and May [*2000*] for considering social capital as an other form of assets using these data. In their analysis, it only turned out to be a significant determinant of 1998 incomes; given the relatively limited number of variables considered, it is unclear, however, to what extent this is driven by left-out variable bias.

27 We did not include changes in physical assets in the regression which are likely to be endogenous.

28 It will not address all forms of measurement errors. For a discussion, see Fields *et al.* [*2003a*].

29 In particular, they significantly affect initial income while in a regression with initial income and the other exogenous regressors, they have no significant impact on the dependent variable (change in incomes or expenditures).

30 They are available on request.

31 For example, Fields *et al.* [*2003b*] find that the change variables have little impact on income change in Venezuela, Spain, and Indonesia, while they also find some of them to significantly influence income change in South Africa.

32 This is, of course, partly dependent on the assumption about economies of scale in the household, but sensitivity analyses showed that the effect remains (though it becomes smaller) even if one allows for considerably greater economies of scale (a scale parameter of 0.6).

33 The literature analysing models with two equilibria [*for example, Galor and Weil, 2000; Lagerlöf, 2002*] also refer to poverty traps where small changes to initial conditions will not allow any improvement in the economic situation as households fall back to the bad equilibrium. With the type of (linear) regression model we use here, we can only examine whether initial conditions such as large household size reduce the likelihood of escaping poverty and this is what we refer to as poverty traps in this context. One way to see whether initial conditions not only hurt the prospect of escaping poverty, but might make it impossible

altogether (and thus be in line with a two equilibria model), is to see whether initial household size has the same impact if we only consider the initially poor in 1993. A separate regression for rural areas shows that the negative effect of household size on income change is no longer significant (results are available on request), suggesting that if one is among the poor, a marginal change to household size would not allow one to escape poverty. This would imply that the finding of a negative and significant coefficient of household size in the full sample is due to the variation between poor and rich households. Thus, we not only have a demographic poverty trap in the sense of household size reducing the likelihood of escaping poverty, but our findings are consistent with two equilibria where a marginal change in the household size of poor people would not allow an escape out of poverty. For urban areas, the sample size is too small to undertake such an analysis.

34 The variable for home ownership was not significant, which probably reflects that it was a poor measure: the vast majority of households reported that they owned their homes, but this does not reflect the vast variation in housing type and value. The variable grazing and land rights is also not significant suggesting that access to such rights have no impact on income change. This is probably due to the fact that these rights are often over tiny and not very productive pieces of land, a legacy of the apartheid era.

35 Note that the change in share of employed and the share of unemployed is not collinear as the share of people out of the labour force constitutes the omitted category.

36 The effect of household size remains strong and significant even when assuming much greater economies of scale (scale parameter of 0.6).

37 There are other minor changes in the importance of some variables. Also note that the fit of the expenditure regressions is generally poorer than the income regressions.

38 As a result, only the employment and the education poverty traps remain significant, while the ones relating to household size and initial assets are no longer significant, although the coefficients have the expected signs.

39 The instrumented expenditure regressions show very similar results, with the net effect being slightly smaller (12 per cent in urban and 18 per cent in rural areas).

40 Two directions of further research are promising. One is to consider quantile regressions to see whether the average effects also hold at different points in the distribution and the other is to split the sample into different groups that might be able to distinguish the chronic from the transitory poor. Having a third wave would be very helpful here; a third wave is currently in the field and will, once available, allow further insights.

41 This result, while suggestive, may also be influenced by unobserved heterogeneity which is correlated with the regressors used. To investigate this, one needs to control for household-specific fixed effects which necessitates a panel of at least three waves.

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APPENDIX

TABLE A1

QUINTILE MOBILITY MATRIX FOR AFRICAN HOUSEHOLDS IN KWAZULU-NATAL

(a) Expenditures	Quintile in 1998					
1993 quintile	1	2	3	4	5	(row) total
1	36.5	26.0	22.0	11.0	4.5	100.0
2	32.0	24.5	18.0	17.5	8.0	100.0
3	14.5	26.5	21.0	24.0	14.0	100.0
4	12.5	17.0	22.5	23.0	22.0	100.0
5	4.5	6.00	13.5	24.5	51.5	100.0

(b) Incomes without imputations	Quintile in 1998					
1993 quintile	1	2	3	4	5	(row) total
1	33.5	23.5	17.7	14.1	11.2	100.0
2	30.2	30.2	17.8	13.0	8.9	100.0
3	17.8	20.1	25.4	23.1	13.6	100.0
4	8.3	20.1	26.6	26.0	18.9	100.0
5	10.7	5.9	12.4	23.7	47.3	100.0

(c) Expenditures without imputations	Quintile in 1998					
1993 quintile	1	2	3	4	5	(row) total
1	32.4	28.2	20.0	13.0	6.5	100.0
2	32.0	21.3	20.7	14.2	11.8	100.0
3	15.4	24.9	19.5	21.3	18.9	100.0
4	13.6	17.8	23.7	22.5	22.5	100.0
5	7.10	7.7	16.0	29.0	40.2	100.0

APPENDIX
TABLE A1 (*cont'd*)
QUINTILE MOBILITY MATRIX FOR AFRICAN HOUSEHOLDS IN KWAZULU-NATAL

(d) Predicted incomes	Quintile in 1998					
1993 quintile	1	2	3	4	5	(row) total
1	43.3	31.3	14.4	5.5	5.5	100.0
2	27.5	27.5	26.0	13.5	5.5	100.0
3	16.4	21.9	23.4	28.4	10.0	100.0
4	9.5	13.0	24.0	30.5	23.0	100.0
5	3.5	6.0	12.4	21.9	56.2	100.0

(e) Predicted expenditures	Quintile in 1998					
1993 quintile	1	2	3	4	5	(row) total
1	48.3	23.9	16.4	7.0	4.5	100.0
2	29.0	30.5	22.5	14.5	3.5	100.0
3	12.9	27.9	26.9	19.4	12.9	100.0
4	8.5	14.0	20.5	35.5	21.5	100.0
5	1.5	3.5	13.9	23.4	57.7	100.0