



UNICEF South Africa and  
the Financial and Fiscal  
Commission of South Africa

## The Impact of the International Financial Crisis on Child Poverty in South Africa



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## **Foreword**

South Africa is recovering from the deepest and most serious economic crisis to affect the world since the Great Depression. Strong links to the world economy meant a sharp fall in demand for South African exports and the fall in prices of key export commodities. The South African economy contracted by almost two percent during 2009. About a million jobs were lost in 2009 alone. There have also been adverse implications for investment, incomes and poverty.

The Government of South Africa has responded to the crisis on several fronts. The broad principles governing government's response include avoiding the risk of unfairly placing the burden of the downturn on the poor and vulnerable; ensuring that all activities are aimed at strengthening the capacity of the economy to grow and create decent jobs during and beyond the crisis; maintaining the planned high levels of investment in public sector infrastructure; and encouraging the private sector to maintain and improve, wherever possible, their levels of fixed direct investment. Old schemes have been stepped up and new ones introduced. The Financial and Fiscal Commission and United Nations Children's Fund (UNICEF) acknowledge the significant role played by old schemes, in particular the Child Support Grant, in lessening the impact of the crisis on child poverty.

As this study notes, almost 40 percent of South Africa's total population are children of 18 years and younger, of which two-thirds live in poverty, compared to the adult poverty headcount of 45 percent. Through the use of macroeconomic and microeconomic simulation tools, the study observes that there is a relatively successful return to pre-crisis poverty headcount levels in a short period of time in South Africa. Of particular importance is how the effects of the crisis are effectively mediated through the Child Support Grant, a uniquely South African feature which has been expanded greatly in recent years and is particularly aimed at children in poor families.

So it appears the institutionalization of social protection programmes in South Africa, especially the Child Support Grant, have paid off in terms of assisting poor families to stay above water in both ordinary and extraordinary times. The Government of South Africa must be commended for continuing this policy during the crisis by extending the coverage of the Child Support Grant.

The Financial and Fiscal Commission and UNICEF are grateful to the team of economists who executed the study, including Ramos Mabugu, Servaas van der Berg, Margaret Chitiga, Bernard Decaluwé, Hélène Maisonnave, Véronique Robichaud, Debra Shepherd and Dieter von Fintel, and George Laryea-Adjei for coordinating this exciting piece of work. Many thanks also to Benjamin Davis, Wei Ha and Ronald Mendoza for providing very helpful comments.

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March 2010, Pretoria

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## Acronyms

AIDS	Almost Ideal Demand Systems
BAU	Business as Usual
CDF	Cumulative Density Functions
CES	Constant Elasticity of Substitution
CGE	Computable General Equilibrium
CPI	Consumer Price Index
CSG	Child Support Grant
FDI	Foreign Direct Investment
FFC	Financial and Fiscal Commission
FGT	Foster-Greer-Thorbecke poverty measure
FOB	Free on Board
GDFI	Gross Domestic Fixed Investment
GDP	Gross Domestic Product
GHS	General Household Survey
IES	Income and Expenditure Survey
IMF	International Monetary Fund
LFS	Labour Force Surveys
MDG	Millenium Development Goals
NIDS	National Income Dynamics Survey
NIEP	National Institute of Economic Policy
OECD AES	Organisation for Economic Cooperation and Development Annual Enterprise Survey
OLS	Ordinary Least Squares
PEP	Poverty and Economic Policy
PGM	Platinum Group Metals
PSLSD	Project for Statistics on Living Standards and Development
SAM	Social Accounting Matrix
UNICEF	United Nations Children's Fund
YTD	Year to date

## Abstract

The financial crisis in the world's major economies and the subsequent world recession also deeply affected South Africa. Some of the impacts were felt in investor and consumer confidence, as well as through strongly declining prices of South African export commodities. Consequently, most of the economy slid into recession which impacted on employment and rising food prices. In this context, poverty probably increased and would very likely have affected children. Almost 40 percent of South Africa's total population are children, of which two-thirds live in poverty, compared to the adult poverty headcount of 45 percent.

This paper reports on a study to provide insights into the magnitude of the shocks associated with the crisis in macroeconomic terms in South Africa, the country's capacity to withstand or cushion these shocks, and the extent of fragility in terms of poverty levels and child well-being. The analysis combines macroeconomic and microeconomic tools to assess the extent of the impact of the crisis on the country. Computable General Equilibrium modelling is employed to estimate the impact of the crisis on key macro-variables. Results of the macro-model are then used to assess the individual and household level effects of the crisis using household survey data and suitable microeconometric techniques. The study finds that the poverty headcount ratio increases insignificantly in the moderate crisis scenario, but substantially under the severe scenario. However, under both scenarios there is a relatively successful return to close to the Business as Usual trend. However, it is important to note that under both scenarios, more poverty sensitive measures (the poverty gap ratio and the poverty severity ratio) decline more and remain in negative territory longer, showing that the major impact of the crisis is on the poorest and that this impact is most difficult to overcome. Setting too high poverty lines and focusing on the poverty headcount ratio would conceal some of this effect.

Of particular importance to this study and of pertinence to other developing countries is how the effects of the crisis are mediated through the Child Support Grant, a uniquely South African feature which has been expanded greatly in recent years and is particularly aimed at children in poor families. This offers a potential source of protection against poverty for poor children if the care-givers regard such grants as primarily for the benefit of the children concerned.

## Introduction

Poverty in South Africa is much higher than one would expect in a country with its level of per capita gross domestic product (GDP). There is a high degree of inequality in South Africa, and it has its origins in the apartheid policies of the past. Child poverty, in turn, is still much higher than poverty amongst adults. This context makes it imperative to deal with the phenomenon of child poverty so as to prevent large numbers of children growing up in dire circumstances that prevent them from developing their potential. Economically, poverty in childhood also leaves a mark of poor human capital and lower productivity in later life, creating the risk of perpetuating the cycle of poverty. To enable upward mobility of those born into poor families, circumstances need to be created to minimise child poverty.

The phenomenon of child poverty is also high on the global agenda in the light of the world economic crisis. This study deals with the impact of the world economic crisis on child poverty in South Africa, linking a macroeconomic Computable General Equilibrium (CGE) model to microeconomic analysis to identify the channels through which economic performance may impact on child poverty, to estimate its likely magnitude and to assess whether policies put in place to deal with child poverty (such as the Child Support Grant) have the desired effect. The paper starts by looking at the background context to child poverty in South Africa, including a profile of child poverty and a brief description of the Child Support Grant, the main instrument used to combat child poverty in South Africa. This is followed by the macroeconomic analysis, simulating the impact of two scenarios reflecting possible magnitudes of the economic crisis on key economic variables. The subsequent section then assesses what the possible impact could be on money-metric child poverty, whilst the final section attempts to place all of the preceding in context. To maintain the text as reader-friendly as possible, it is largely kept free of technical analysis and description of the methodology, some of which are dealt with in appendices.



## **1. Background to the economic crisis and child poverty in South Africa**

### **1.1 The economic crisis**

The global financial crisis and resulting economic crisis have created widespread concern around the world. The global crisis is having a serious impact on developing countries, particularly in sub-Saharan Africa. South Africa has not escaped the effects of the global recession. In the last quarter of 2008 the economy went into decline, export earnings fell and jobs were lost. Two quarterly GDP declines confirmed the country's first recession in 17 years. The demand for mining products reduced overnight and manufacturing activity declined significantly. Job losses are expected to be high due to retrenchments in these sectors as manufacturing alone accounts for 16% of GDP and employs 14% of workers. By the end of the third quarter of 2009, cumulative job losses over the previous year had mounted to almost one million. Job losses will have a negative impact on demand for goods and services. Banks are experiencing a huge increase in bad debts resulting from massive lending prior to the introduction of the National Credit Act and the effect of the credit crunch, consequently they are now reluctant to grant new loans. The economic downturn was also reflected in gross domestic fixed investment. The real value of recorded building plans passed by larger municipalities (at constant prices) between January and September 2008 decreased by 14.9%, or R5.4 billion, compared with the same period for 2007.

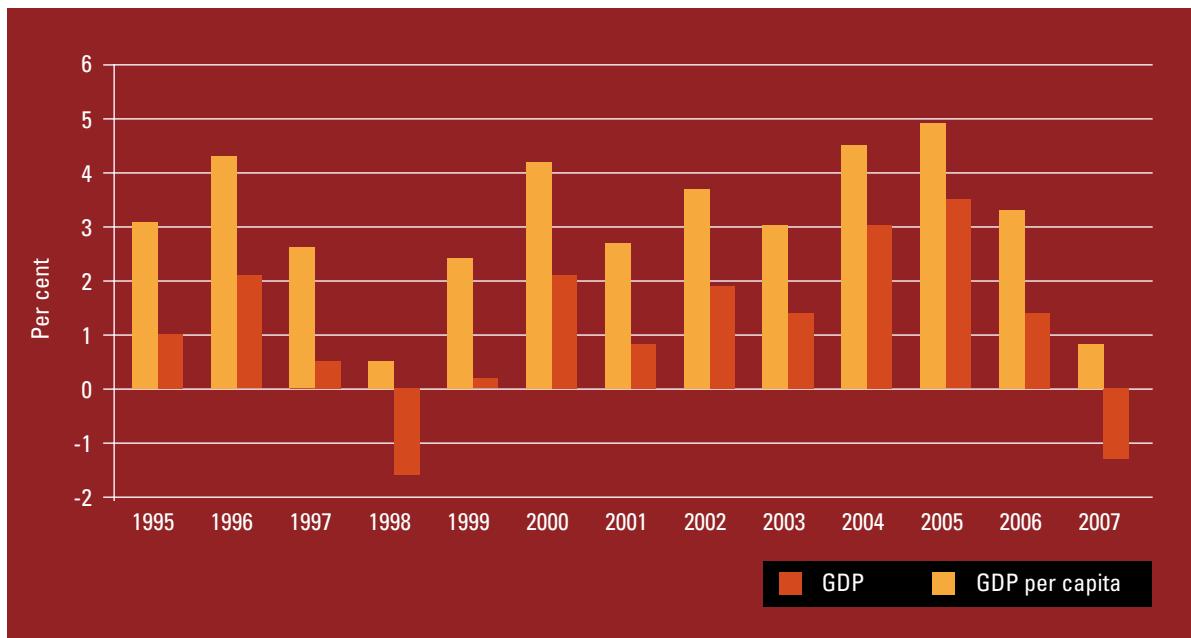
The economy seemed to emerge from recession in the third quarter of 2009 but job losses, which usually lag economic activity, are still continuing. Nominal salary increases will be smaller than anticipated despite stubbornly high inflation. House prices are also only starting to record positive growth again.

Until recently, the economic performance of post-apartheid South Africa had been relatively impressive, averaging 3.3% growth rate for real GDP and 1.4% in *per capita* terms for the period 1995 to 2005.

The International Monetary Fund (IMF) has recently downgraded its forecasts for economic growth in advanced economies quite dramatically. To the extent that South Africa's historical economic growth rate has been very closely linked to that of the world economy since 1993/94, such downward revisions in the forecasts for the world economy imply reduced domestic growth.

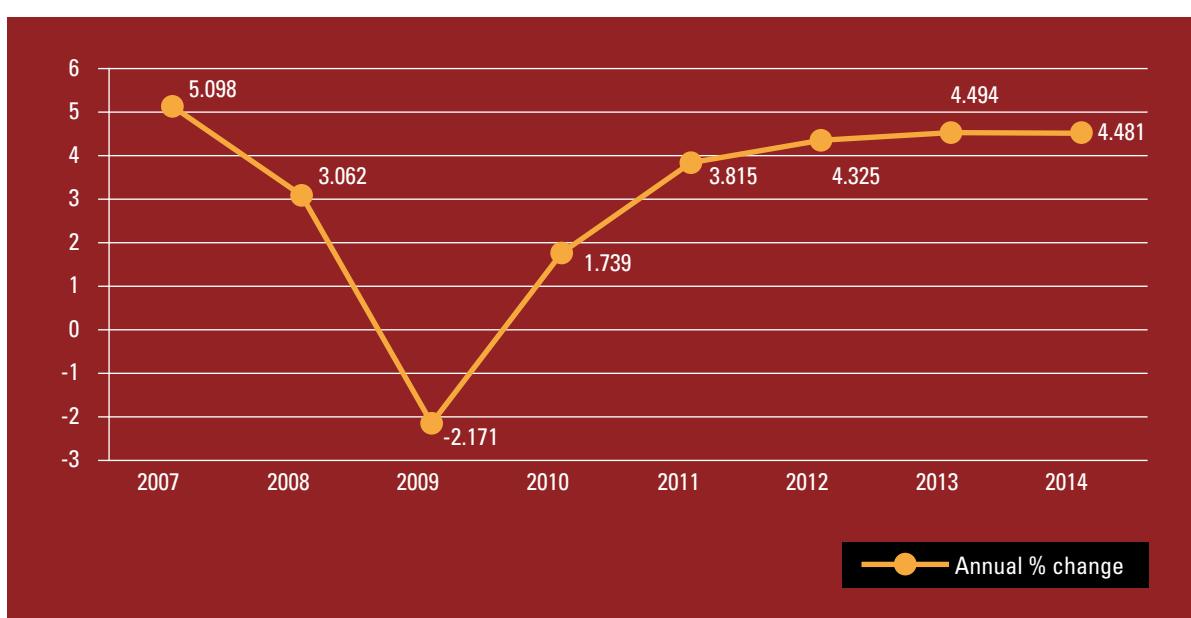
In this context, it is likely that poverty has been increasing and that this has affected children. The concern is

Figure 1: GDP and GDP *per capita* growth rates (constant 2000 prices)



Source: South African Reserve Bank (SARB) Database ([www.reservebank.co.za](http://www.reservebank.co.za))

Figure 2: IMF Growth Projections for South Africa (estimates start after 2008)



Source: IMF, World Economic Outlook Database, October 2009

around the extent to which the crisis has undermined gains in child well-being in recent years, as well as risked the achievement of child-related targets of the Vision 2014 and the Millennium Development Goals (MDGs). Thus, the crisis will further compound challenges in meeting MDGs and realising the rights of the child. It will be important to consider how these effects are mediated via mechanisms that may partly protect children from such shocks.

## 1.2 A profile of child poverty in South Africa<sup>1</sup>

To derive a profile of child poverty, a poverty line is set at the 40th percentile of household *per capita* income in IES 2005.<sup>2</sup> Naturally, there are important issues about the appropriate poverty line and about whether it would make a difference if some adult equivalent scale was used instead of *per capita* income. But we have dealt with that in other work (Streak, Van der Berg & Yu, 2009) and concluded that the profile of poverty is insignificantly affected by the use of any adult equivalent scale, and that there is stochastic poverty dominance across most dimensions,<sup>3</sup> i.e. the profile of poverty would not change much if an alternative poverty line or poverty measure was used rather than the headcount ratio. Thus the use of *per capita* income rather than adult equivalent income reflects the fact that our findings on the insensitivity of the child poverty profile to the choice of adult equivalence scale support the argument of Woolard & Leibbrandt (2006), i.e. that one may as well use the simple *per capita* method for profiling poverty in South Africa and testing its robustness rather than the alternative poverty lines.

Table 1 presents the profile of child poverty. As poor households tend to be larger, the poverty headcount for the population as a whole is 52.9%. But poorer households contain a disproportionate number of children: 65.5% of children are amongst the poor (this translates into 11.8 million poor children)<sup>4</sup> versus only 45.2% of the adult population. Moreover, similar differences between adult and child poverty apply for the depth and severity of poverty. In fact, the proportional differentials are larger, indicating that children's share of the poverty headcount rises if lower poverty lines are used, due to more severe poverty amongst children than adults.

With respect to age, Table 1 illustrates that the poverty headcount and poverty shares based on the headcount are highest amongst the youngest age cohort, followed by children aged 5–14 and 15–17. The profile also confirms the racial dimension of child poverty which is much higher amongst black children but also high amongst coloured children.<sup>5</sup> The poverty depth and severity measures are also far higher for children from these groups. There is little gender difference in child poverty. Child poverty is still more prevalent, deeper and more severe in rural areas – nearly two-thirds of children identified as poor live in rural areas. Its rural face is the most prominent feature of child poverty in South Africa, and this especially applies when the depth and severity of poverty are considered: the rural poor are further below this poverty line than the urban poor, and the share of the rural child poverty headcount thus rises as the poverty line is set lower. There is large variation across provinces in child poverty.

Though the poverty incidence is highest in Limpopo, the poverty share of more populous provinces is larger. KwaZulu-Natal and the Eastern Cape together contain 46% of poor

- 
1. This section draws from joint work with Judith Streak and Derek Yu (cf. Streak et al. 2009).
  2. Such a line is arbitrary, but accords with what has also been used by a number of other authors, particularly in assessing the effect of the adult equivalence scale used.
  3. The exception is province: There is no stochastic poverty dominance across this dimension, thus there are some provinces whose poverty ranking would change should another poverty line or another poverty measure be used.
  4. This level, though somewhat arbitrary considering the equally arbitrary choice of poverty line, can be seen in the context of findings based on earlier data sets that used similar poverty cut offs. The NIEP (1996) measurement study based on the PSLSD 1993 and which used the old OECD AES, found the poverty headcount amongst children aged 0–4 years to be 60%. Woolard (2002), using the OHS 1999, a welfare indicator of per adult equivalent income and a Cutler & Katz (1992) type AES with the child cost parameter set at 0.6 and economies of scale parameter at 0.9, found it to be 59.2% amongst children aged 0–17 and 59.3% amongst children aged 0–6. Thus the poverty findings here are not all that different from those in previous studies, whereas there is somewhat less child poverty if the suggested Statistics SA poverty line is used.
  5. Definition of households by colour is one of the popular ways used in South Africa. Including the race-based definition is rooted in the apartheid period policies. "Black" people of South Africa are natives of the country and mainly include the Zulu, Xhosa, Ndebele, Swazi, Sotho-Tswana, Tsonga and the Venda language groups. "White" people are mainly descendants of the colonial immigrants of Dutch, German, French Huguenot and British origins. "Coloureds" are most commonly people of a mixed race or descendants of the Khoi and San, and "Asians" are mainly people of Indian descent (South Africa. Info, 2007).

children. The rankings for the poverty severity measure are slightly different from those on the depth and headcount measures, indicating that stochastic poverty dominance does not always hold. KwaZulu-Natal has the highest poverty severity, whilst it has the second highest depth of poverty and the third highest poverty headcount. Limpopo is ranked third in terms of the severity and depth measures, but first on the poverty headcount measure. Western Cape is the best performer for all three of the Foster-Greer-Thorbecke (FGT) poverty measures – it has the lowest child poverty headcount rate, lowest depth of child poverty and lowest child poverty severity.

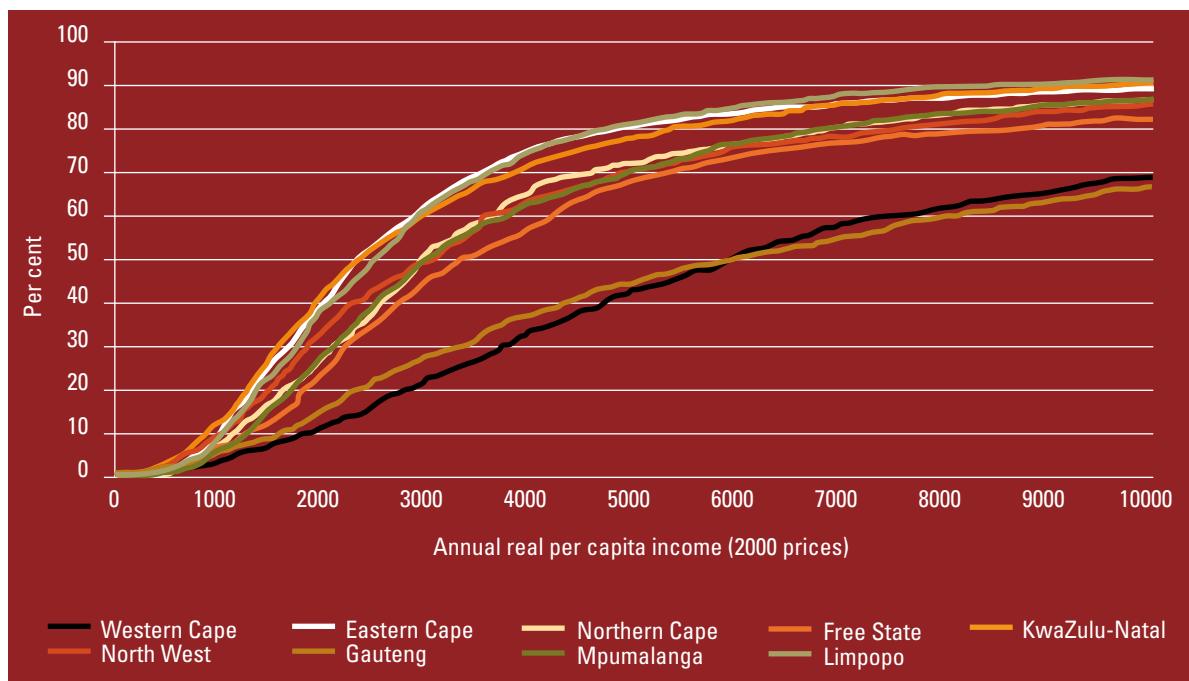
**Table 1: Poverty profile for children and adults using income *per capita* as the welfare measure and with the poverty line set at the 40th percentile of households**

	CHILD POVERTY (0–17 YEARS)					ADULT POVERTY		
	$P_0$ POVERTY HEADCOUNT RATE		$P_1$ POVERTY DEPTH MEASURE	$P_2$ POVERTY SEVERITY MEASURE	$P_0$ POVERTY HEAD-COUNT RATE	$P_1$ POVERTY DEPTH MEASURE	$P_2$ POVERTY SEVERITY MEASURE	
	RATE (%)	SHARE (%)	NUMBER		RATE (%)			
<b>AGE</b>								
0–4	66.1	26.0	3 066 509	0.336	0.213			
5–14	65.7	56.5	6 681 507	0.343	0.202			
15–17	63.8	17.5	2 067 609	0.332	0.203			
0–17 (ALL CHILDREN)	65.5	100.0	11 822 544	0.328	0.205			
18+ (ALL ADULTS)					45.2	0.213	0.126	
<b>RACIAL GROUP</b>								
BLACK	72.5	93.9	11 100 826	0.375	0.232	54.4	0.261	0.156
COLOURED	41.3	5.3	623 412	0.167	0.093	30.1	0.110	0.057
ASIAN	24.2	0.7	76 137	0.093	0.052	13.7	0.049	0.027
WHITE	2.0	0.2	18 081	0.012	0.008	1.2	0.006	0.004
<b>GENDER</b>								
GIrls	65.4	49.1	5 819 410	0.336	0.204	39.7	0.238	0.142
Boys	65.6	50.9	5 985 265	0.332	0.206	49.9	0.184	0.109
<b>URBAN/RURAL LOCATION</b>								
RURAL	82.8	63.3	7 376 451	0.446	0.280	69.0	0.344	0.209
URBAN	48.6	36.7	4 442 491	0.226	0.133	31.7	0.139	0.080
<b>PROVINCE</b>								
WESTERN CAPE	37.9	5.0	587 580	0.153	0.085	25.1	0.094	0.048
EASTERN CAPE	77.9	20.1	2 378 696	0.415	0.258	59.8	0.292	0.174
NORTHERN CAPE	69.1	2.0	235 269	0.333	0.195	48.5	0.219	0.126
FREE STATE	63.6	5.9	695 166	0.294	0.171	44.2	0.193	0.110
KWAZULU-NATAL	75.0	25.2	2 975 734	0.413	0.266	53.8	0.279	0.175
NORTHWEST	66.2	8.1	962 355	0.345	0.216	49.3	0.239	0.143
GAUTENG	41.3	9.6	1 138 511	0.186	0.110	26.0	0.111	0.065
MPUMALANGA	66.4	7.2	846 494	0.322	0.187	48.6	0.218	0.123
LIMPOPO	78.0	16.9	2 002 739	0.400	0.242	65.6	0.313	0.183

Source: Own calculations using IES 2005 data

Testing the robustness of the child poverty profile to selection of the poverty line found the age, race, gender and urban/rural dimensions to be robust. In the poverty-relevant range, there is clear first order dominance in each of these cases, implying that the rankings of poverty are invariant to the poverty line chosen and to whether the poverty measure used is Po, P<sub>1</sub> or P<sub>2</sub>. The results for the provincial rankings are slightly more complex and hence the provincial cumulative density functions (CDFs), or curves, or poverty incidence curves are shown in Figure 3 below. The CDF shows the population arranged from poorest to richest using the chosen poverty measure and expresses those below any possible poverty line as a percentage of the total population (Deaton, 1997), i.e. it shows the headcount ratio of poverty at different alternative poverty lines. It is thus also known as a poverty incidence curve. Regardless of where the poverty line is drawn, Western Cape and Gauteng have the lowest child poverty headcount rates. However, up to an income level of approximately R6 000 *per capita* per annum, Western Cape has the lowest headcount, but thereafter there is a switch. Excepting at very low poverty lines, three provinces – KwaZulu-Natal, Limpopo and Eastern Cape – have the highest poverty headcounts. There is also a shift in the rankings of the weakest performers as alternative poverty lines are set.

**Figure 3: P0 (0–17 years) by province, *per capita* method**



Where one CDF consistently lies above another, there is first order stochastic poverty dominance. This implies that the ranking of poverty between two such provinces remains unchanged whatever poverty line is used and whichever of the three FGT poverty measures (Po, P<sub>1</sub> or P<sub>2</sub>) is analysed. The crossing of the lines that is observed implies that the ranking of child poverty is affected by both the poverty line chosen, and by whether the poverty measure used is the headcount, depth or severity of child poverty. That confirms the results from Table 1. It matters which measure is used, and this analysis also implies that the choice of the poverty line itself is important for ranking poverty between provinces. At very low poverty lines, the severity of child poverty that KwaZulu-Natal experiences will be reflected even in the headcount index, but if poverty lines are set high, there is a danger of underestimating KwaZulu-Natal's child poverty share when focusing on the headcount rate only.

The profile of child poverty in South Africa presented here based on IES 2005 suggests that child poverty (65.5%) remains more extensive than poverty of the population as a whole (52.9%) and poverty amongst adults (45.2%) if a poverty line is used that was set to include

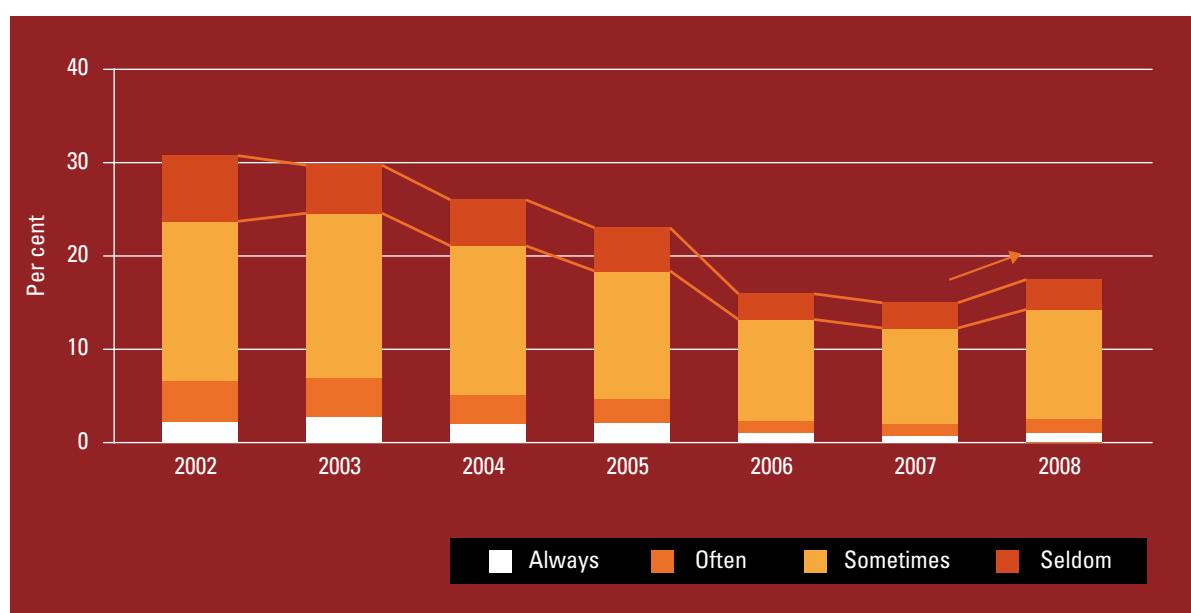
40% of households amongst the poor. This confirms that children are more often found in poorer households. Moreover, despite the massive injection of transfers into households with poor children through the introduction and expansion of Child Support Grant, poverty amongst children is still substantial.

The child poverty profile shed new light on the age dimensions of child poverty. The head-count, depth and severity of poverty are all higher amongst children in the youngest age cohort (0–4) followed by children aged 5–14 and then by those aged 15–17. This is surprising in view of the fact that the Child Support Grant did not, at the time of the survey, extend to the oldest group, so one would have expected households containing only older children to perhaps experience more poverty.

### 1.3 Trends in child poverty and the role of social grants

There is mounting evidence that poverty has been declining substantially since 2000, and this decline is largely caused by the expansion of social grants, in particular the Child Support Grant. For instance, Leibbrandt, Woolard and Woolard (2009) summarise the evidence regarding poverty trends by saying poverty had declined and the social grants had largely been driving this process. But non-comparability between surveys obscures the measurement of poverty trends. A non-money-metric measure, child hunger as reported by respondents in large annual household surveys, has been on a consistent downward trend. This also applies to the severity of poverty; the more severe measures, of always or often experiencing hunger, also dropped sharply (Figure 4). Importantly, the turnaround in the trend in reported hunger in 2008 following the advent of the global crisis is in line with expectations and strengthens one's confidence in this social indicator.

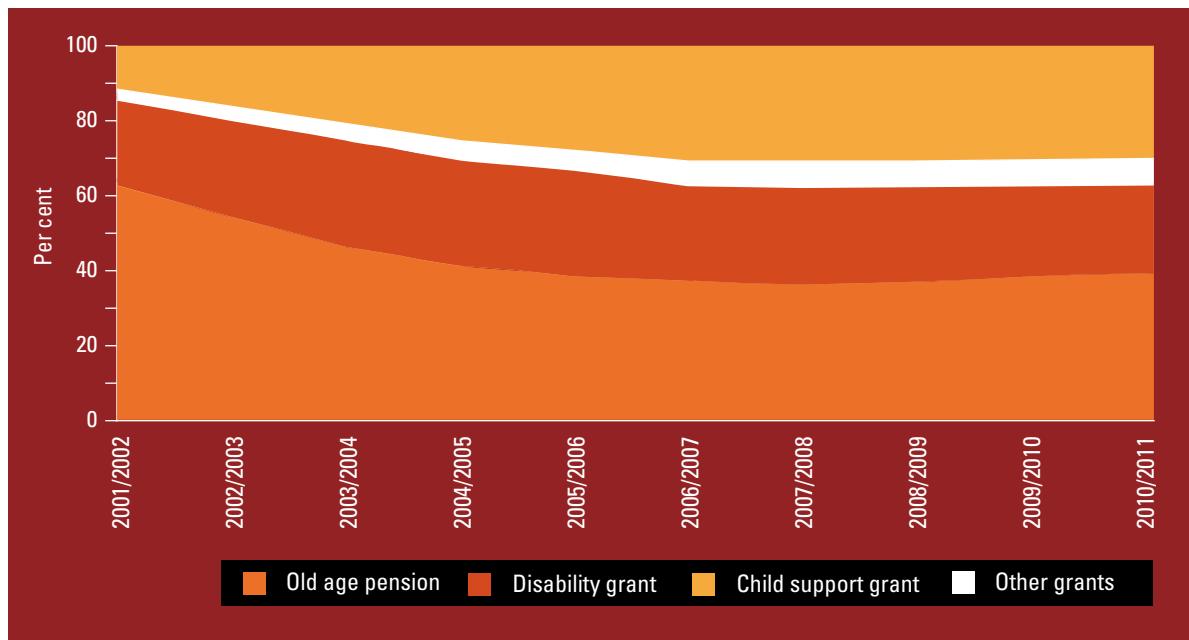
**Figure 4: Households that reported that children went hungry in the past year**



Source: Own calculations from General Household Surveys

The Child Support Grant, introduced in 1998, expanded rapidly. By April 2001, approximately one million people received the Child Support Grant; this had increased more than eight-fold by April 2008. Figure 5 confirms that the child support grant is the most rapidly growing grant type.

**Figure 5: Percentage contribution of spending on each type of social grant to total spending on social grants**



Source: National Treasury website

It is thus worthwhile to investigate the role of the grant system in driving down poverty. Table 2 and Figure 6 show that coverage was expanded in two ways: on the one hand, coverage of those in the age-eligible group grew over time, and on the other, age eligibility was increased from initially those below eight years of age to those below 15 years.<sup>6</sup> There has been a continuous upward trend in the percentage of age-eligible children receiving the Child Support Grant (i.e. in the coverage rate), from 27.0% in 2003 to 45.6% in 2006. The coverage rate is more than 50% in 2006 in Eastern Cape, Mpumalanga and Limpopo, but the lowest in Western Cape and Gauteng, reflecting the differences in the preponderance of poverty. Coverage in Western Cape has remained at about 25% throughout the years, while there has been a slight upward trend in Gauteng. In contrast to these provinces, coverage in provinces where one would expect most poor children to be was initially low due to slow roll-out, but rose very rapidly (e.g. from less than 26% to over 56% in Eastern Cape). Remarkably, the programme also succeeded in expanding coverage to be greatest in rural areas where the poor are concentrated, something seldom achieved in social programmes in developing countries.

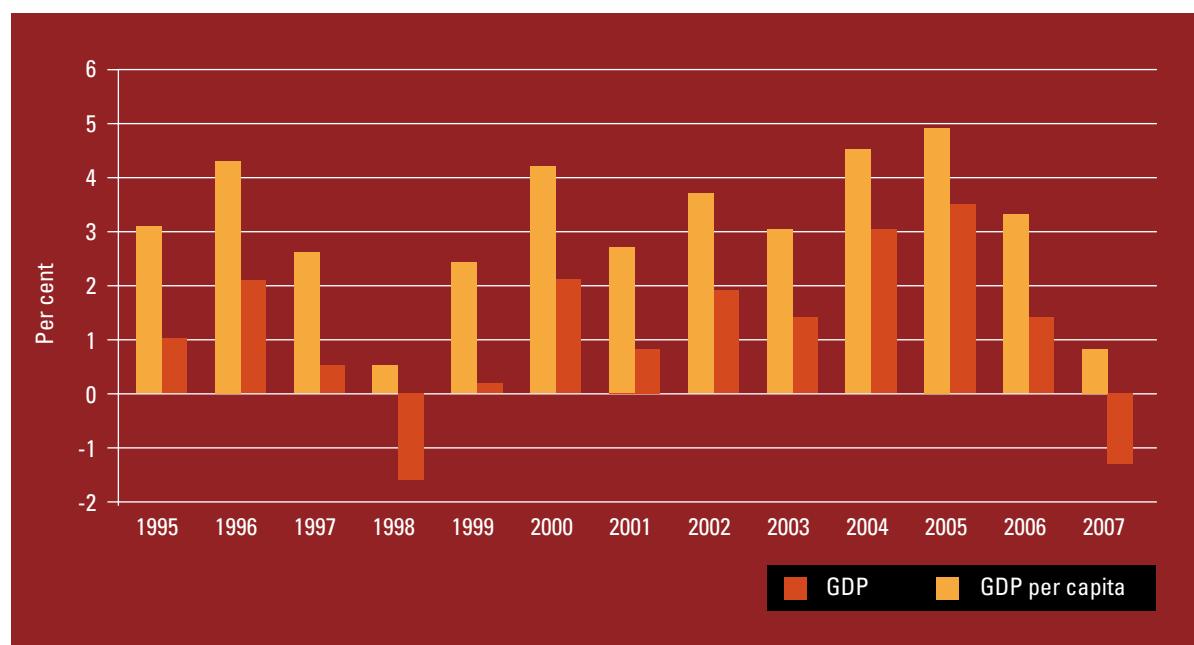
6. The age-eligibility rules for the CSG have been changed in gradual steps. When it was introduced, caregivers who met the means test criteria could receive the grant until the child turned 7. This was expanded to children under 9 years in 2003, to children under 11 years in 2004, to children under 14 in 2005, and it will be further extended to children under 15 in 2009 (see Tables 7 and 8). According to the data from the GHS surveys, the coverage of individual children in the age-eligible group increased from 27% in 2002 to 46% in 2006, while for households with age-eligible children coverage increased from almost 20 to 51% in the same period (Table 8). Higher coverage with an unchanged means test in nominal terms (implying that in real terms the means test became increasingly strict over the period concerned) implies that the expansion was largely the result of increased roll-out of the grant to a growing proportion of those qualifying for it.

Table 2: Number of individuals and households receiving Child Support Grant

INDIVIDUALS						
GHS	ELIGIBLE AGE	RECIPIENTS OF CHILD SUPPORT GRANT			POPULATION OF ELIGIBLE AGE [D]	COVERAGE RATE [A]/[D]
		OF ELIGIBLE AGE [A]	NOT OF ELIGIBLE AGE [B]	TOTAL [C]		
2003	0–8 years	2 241 760	321 534	2 563 294	8 299 039	27.01%
2004	0–10 years	4 201 481	175 526	4 377 007	11 100 241	37.85%
2005	0–13 years	5 702 793	139 043	5 841 836	14 052 170	40.58%
2006	0–13 years	6 459 760	265 579	6 725 339	14 152 509	45.64%
HOUSEHOLDS						
GHS	ELIGIBLE AGE	NUMBER OF HOUSEHOLDS CONTAINING AT LEAST ONE CHILD IN ELIGIBLE AGE	NUMBER OF HOUSEHOLDS CONTAINING NO CHILDREN IN ELIGIBLE AGE	TOTAL	NUMBER OF HOUSEHOLDS CONTAINING AT LEAST ONE CHILD IN ELIGIBLE AGE	COVERAGE RATE
		845 577	79 725	925 302	4 329 616	19.53%
2002	0–6 years	1 830 602	42 599	1 873 201	5 141 072	35.61%
2003	0–8 years	2 776 295	29 621	2 805 916	6 054 697	45.85%
2004	0–13 years	3 289 555	20 455	3 310 010	6 701 973	49.08%
2005	0–13 years	3 504 585	35 843	3 540 428	6 884 332	50.91%

Source: Statistics South Africa General Household Surveys (various issues)

Figure 6: Child support grant coverage rates for different eligible age groups



**Table 3: Percentage of eligible children receiving Child Support Grant by demographic characteristics**

	GHS 2003	GHS 2004	GHS 2005	GHS 2006
ALL	27.0%	37.9%	40.6%	45.6%
<b>PROVINCE</b>				
WESTERN CAPE	23.5%	26.6%	25.4%	27.5%
EASTERN CAPE	25.8%	34.0%	46.8%	56.3%
NORTHERN CAPE	14.0%	34.6%	37.2%	39.0%
FREE STATE	34.3%	42.9%	47.0%	49.4%
KWAZULU-NATAL	21.6%	33.5%	38.4%	43.5%
NORTH WEST	29.6%	45.9%	40.6%	48.4%
GAUTENG	19.3%	26.8%	29.1%	32.2%
MPUMALANGA	38.3%	48.4%	47.9%	54.8%
LIMPOPO	39.7%	55.9%	51.4%	54.2%
<b>AREA TYPE</b>				
URBAN	21.9%	29.9%	n/a	n/a
RURAL	31.7%	44.7%	n/a	n/a
<b>GENDER</b>				
MALE	26.6%	37.4%	40.4%	45.1%
FEMALE	27.4%	38.4%	40.9%	46.2%
<b>RACE</b>				
BLACK	30.8%	43.0%	45.5%	51.1%
COLOURED	16.0%	24.1%	25.0%	26.6%
INDIAN	2.3%	5.8%	12.6%	16.6%
WHITE	0.8%	0.3%	0.8%	0.8%

Note: Area type is no longer available from GHS 2005.

Source: Statistics South Africa General Household Survey (various issues)

Figure 7 shows that targeting is fairly good (a far higher proportion of age-eligible children receive the grant in the poorest deciles), and also that the progressiveness has increased with increased roll-out over time. However, there are still major errors of exclusion: many age-eligible children in the lowest wealth deciles do not receive the grant.

More than 50% of Child Support Grant recipients come from female-headed households. Coverage rates for male and female-headed households are quite similar. Although female-headed households are in the minority by far, they constitute the majority of households with age-eligible children.

It has been shown that the expansion of the social grant system, in particular the Child Support Grant, has been instrumental in reducing poverty in the period after 2000 (Van der Berg, Louw & Yu, 2008). However, the CSG could also potentially create important perverse incentive effects that may undermine its beneficial influence on poverty. Potentially, incentives related to the grant structure and rule can affect work effort, household formation, the location of children (where households are loosely structured) and even fertility, and social grants have a large fiscal cost. Though some doubt the magnitude of these perverse incentive effects, they are nevertheless important to consider. A simple way of illustrating this is to imagine what would happen if the grant were to be 10 or 20 times as large as currently. In the context of substantial poverty, there can be little doubt that it would indeed increase fertility in some contexts. Thus the question is not whether grants *can* have such perverse incentive

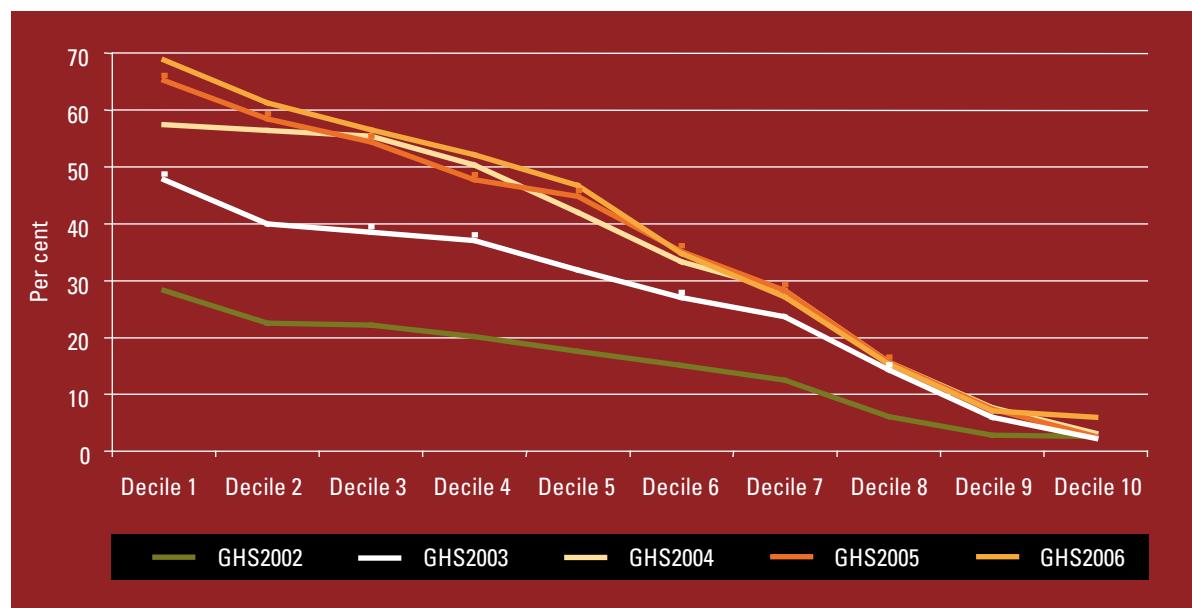
effects, but rather how large these are and whether these negative incentive effects outweigh their positive impacts on child poverty. Our assessment, based on the available literature, is that the grants at present have strong beneficial effects in terms of their impacts on child poverty.

Yet at the same time one must not be over-optimistic about the fiscal sustainability of further major expansions of the grants. Such doubts arise from a combination of reasons. Firstly, government's fiscal position has worsened as a result of the economic crisis. Secondly, changes in the age criteria for the child support grant and old age pension have expanded the number of age-eligible. Thirdly, improved administration and roll-out have brought grants to many who were formerly not reached by the grants, and there are still large numbers who qualify yet do not currently receive the grant, so numbers are expanding. Finally, spending on social grants ( $3\frac{1}{2}$  of GDP) is already quite high by international comparisons (almost twice the levels of other developing countries with large grant systems). Government has also expressed its intention to limit further grant expansion and focus on other poverty-alleviation measures.

The grants have been reducing poverty in a time of good economic growth. However, the disruption to growth and the world economic crisis may have reversed some of the poverty improvement. However, a hypothesis of the present research is that the grants also provide a measure of protection against economic shocks. The logic is simply that grants are a form of income diversification, and that like all forms of such diversification, they offer protection for the beneficiaries against risks of income loss, e.g. from losing employment. Thus one could consider the Child Support Grant an important factor ameliorating the impact of the economic crisis on child poverty.

The next part of the paper turns to the macroeconomy, to assess how great the impact of the economic crisis may be on GDP, employment and consumption. This will be linked in the subsequent section with the micro-simulations to assess the impact of the economic crisis on poverty and specifically child poverty.

**Figure 7: Child Support Grant roll-out: progression over time in Child Support Grant coverage rates in households by earnings decile<sup>7</sup>**



7. Note that the GHS does not provide full information on income. Households who have some earnings from labour income were then ranked by this measure. This would not perfectly match rankings based on all income information, the more appropriate ranking, but there is a strong association between these two rankings. Using rankings based on earnings allows one to track the pattern of targeting over time from the annually available GHS surveys.

## **2. The economy-wide impact of the economic crisis<sup>8</sup>**

### **2.1 Brief overview of data, assumptions and methodology for the macro-model<sup>9</sup>**

The 2005 Social Accounting Matrix (SAM) is used for the economy-wide modelling of the crisis. The SAM has 54 activities and 54 commodities; two broad factors, labour and capital; four institutional sector accounts (households, enterprises, government and the rest of world); and two saving and investment accounts (change in inventories and gross domestic fixed investment [GDFI]). Trade, demand, industry production and household demand parameters are borrowed from other sources and the unemployment rates are drawn from the Labour Force Survey. Import penetration and export intensity rates reflect existing trade patterns (see Appendix Table A1). Gold (98% of its production), scientific equipment (84%) and machinery and equipment (67%) rely heavily on exports. A decrease in world demand or in international prices for these commodities will thus have a huge effect. In the same way, some sectors depend heavily on imports such as radio and equipment (39%) or mining (30%). South Africa exports most of its mineral and precious metals which together represent 40.9% of total exports. An external shock on mineral prices would thus have strong effects on the economy.

In 2005 South Africa had anticipated long-run GDP growth rates of 4.5% per year. This forms the basis for the BAU simulation. To reach this growth, we add a total factor productivity parameter. Moreover, information on investment by destination for all the sectors as well as depreciation rates by activities from the South African Reserve Bank has been used. Statistics SA estimated that the population will grow at a rate of around 1%. Calibrating the BAU on these “real” data, capital grows faster than labour, so the BAU reflects a decrease in unemployment. Moreover, as production factors become more efficient, prices decrease (in real terms). These items of information are important in order to understand the results.

To evaluate the impact of the world economic crisis on South Africa, we use the dynamic Poverty and Economic Policy (PEP 1-t) standard model proposed by Decaluwe et al (2009), changing several assumptions to

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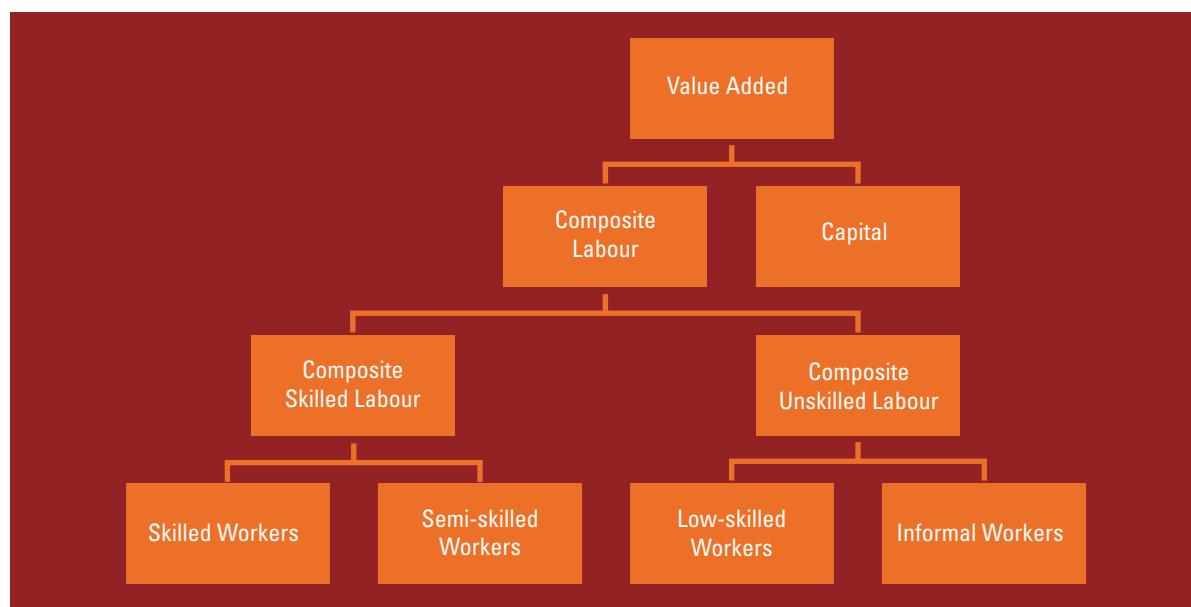
8. We are grateful to Andre Lemelin for his comments on an earlier version of this section.

9. For more details, see the Methodological Annex.

better reflect the South African economy. The model has two production factors, capital and labour; the latter is disaggregated into informal, unskilled, semi-skilled and highly skilled workers.

The production function technology is assumed to be of constant returns to scale and is presented in a four-level production process. At the first level, output is a Leontief input-output of value added and intermediate consumption. At the second level, a CES (Constant Elasticity of Substitution) function represents the substitution between composite labour and capital. At the third level, composite labour demand is also a CES function between composite-skilled and composite-unskilled labour. Note that the composite-skilled demand is a CES with a low elasticity between skilled and semi-skilled workers, reflecting the fact that it is difficult to substitute semi-skilled for skilled workers. We also use a CES to describe the composite unskilled labour demand between informal and unskilled workers. Figure 8 gives the value added structure.

**Figure 8: The value added structure**



South Africa faces high unemployment but unions are very strong. As a result, wages and salaries are strongly rigid downwards. To take this rigidity into account, we assume that wages cannot decline. Thus, if production decreases, producers will not be able to decrease their wages below initial levels, and will therefore have to retrench some workers.

As South Africa is a small country, world prices are assumed fixed. However, we assume that South African exporters face a less than infinite foreign demand equation for exports. In order to increase their market share on the world market they need to reduce their FOB prices for exports. Factor supplies are fixed in the first period and then grow at the population rate for labour force using an accumulation equation for capital. Transfers between institutions and government consumption in volume are fixed at the base year and then grow at the population rate. We assume that the rest of the world's savings is a fixed proportion of GDP and we do not allow South Africa to borrow further from the rest of the world.<sup>10</sup>

As the dynamic CGE model does not take into account financial flows, it cannot directly capture the financial consequences of the world economic crisis on the South African economy. However the economic consequences of the slowdown of the world economy will be captured

10. Fixing the current account balance as a proportion of GDP implies that South Africa cannot borrow from abroad as much as it wants. This thus rules out an endogenous current account balance.

through the real side of the CGE model. The main transmission channels of the world crisis to developing countries are a decrease in export demand and export prices, a decrease of foreign direct investment and a tightening of the capacity to finance a current account deficit, a decrease in remittances and a drop in tourism revenues. For South Africa, however, the latter two channels are not relevant: South Africa does not receive substantial household-to-household remittances from abroad and tourism has not decreased.<sup>11</sup> Thus we will focus on the external trade and foreign financing of domestic firms.

An innovation of our study is that we split the economy into four different groups of activities. Each group is defined by its degree of dependency/exposure to the global crisis and is assumed to be affected differently by the crisis. The four groups are defined as follows (see Table A2 in Appendix A).

*Unaffected sectors (Group 1):* It is assumed that these sectors will face neither a reduction in foreign demand nor a reduction in international prices. Basically, Group 1 consists of gold, food and beverage commodities.

*Weakly affected sectors (Group 2):* These sectors are not heavily dependent on foreign trade and not closely related to other sectors. Found here are agriculture, clothing and wood.

*Mildly affected sectors (Group 3):* Like the previous group, these sectors are not heavily dependent on foreign trade but are closely linked to other sectors. Such sectors will react to a reduction in consumption, investment expenditures or reduction in demand for intermediate goods. This group includes most transports products, trade and construction.

*Strongly affected sectors (Group 4):* These sectors are closely linked to international markets either on the export or import side. Here we find fossil fuels, other mining, machinery and equipment.

Mildly affected sectors represent around 60% of total output, while strongly and mildly affected sectors together represent 80% of total exports.

Two scenarios are presented over and above the BAU scenario. They are distinguished by the magnitude of the recession (severe or moderate). The moderate scenario is consistent with the view that growth began to pick up, albeit moderately, from the end of 2009 onwards. We also model a severe scenario that reflects a protracted slow global growth era and implies tight public budgets for some time to come.<sup>12</sup> It is important to investigate what impact that scenario might have on the sustainability of interventions to protect children and poor families.

The next set of tables presents the details of the proposed scenarios.

**Table 4: Moderate scenario**

	CHANGES IN WORLD PRICES OF EXPORTS AND IMPORTS	CHANGES IN WORLD DEMAND FOR EXPORTS
WEAKLY AFFECTED	-2% in 2008 and 2009	
MILDLY AFFECTED	-3.5% in 2008–2009 and +2.1% in 2010	-2% in 2008–2009, and +2.1% in 2010
STRONGLY AFFECTED	-5% in 2008–2009 and +2.1% in 2010	-2% in 2008–2009, and +2.1% in 2010

11. We do not consider tourism because essentially a drop in tourism has not been noticed because one factor in the steady performance of tourism in 2009 was that many sports events were organised in South Africa (the Confederation Cup, British Lions' Rugby Tour, Super 14 Rugby and preliminary organisation for the World Cup). Note also that the term "remittances" as used here refers to international remittances, of which transfers of investments are dominant. Thus the remittances included are transfers from the rest of the world to households. On the other hand, we do not take local remittances (from urban households to rural households) directly into account. They are taken into account in the model as transfers from households to households, and they depend on households' income.

12. See Tables A4, A5 and A6 in Appendix A.

**Table 5: Severe scenario**

SECTORS	CHANGES IN WORLD PRICES FOR EXPORTS AND IMPORTS	CHANGES IN WORLD DEMAND FOR EXPORTS
WEAKLY AFFECTED	-10% in 2008 and 2009	
MILDLY AFFECTED	-15% in 2008 and 2009	-10% in 2008–2009, and +1% in 2010
STRONGLY AFFECTED	-20% in 2008 and 2009	-10% in 2008–2009

In terms of foreign financing of domestic firms, we assume that foreign transfers to firms decrease by 5% in 2008–2009 and then increase by 2.1% in 2010 in the moderate scenario. In the severe scenario, we assume that they decrease by 10% in 2008–2009 and then increase by 1% in 2010. This reduction corresponds to a tightening of the liquidity available to firms to finance their investment programme, and it has an indirect impact on the current account as it reduces the financial resources available to finance imports and will require an increase in exports to compensate. After 2010, world prices recover to their BAU values; world demand increases at the population growth rate.

## 2.2 Results

Given the magnitude of the different shocks, each scenario will generate differential outcomes on industries' output, the entire price structure and, consequently, factor reallocation. However, the final impact on households will depend on their factor endowments and their sources of income, including transfers, as well as their consumption patterns. These effects are different in the short run compared to the long run and this is partly why dynamic analysis is called for. The following sections discuss in detail the impacts of the price and demand shocks as they channel through changes in macroeconomic variables and the government budget, sectoral outputs, and the incomes and savings of agents (individuals and firms).

### 2.2.1 Impact on prices

As mentioned, this CGE model assumes that in order to protect foreign market share, South African exporters must adjust their FOB prices, taking into account prices of competitors and the world elasticity of demand for South African goods. Table 6 summarises the impact of the two scenarios on export prices. As can be seen, there is a huge decrease in export prices following the drop in international prices and demand, and the decrease is of course much greater for the severe scenario. For the strongly affected sectors, the drop of FOB prices is a little less than the drop in world export prices (-5% in 2008 and 2009 for world prices, and -4% and -2.7% for the FOB prices in the moderate scenario). This implies that South African firms are losing ground with respect to their competitors and do not adjust fully to the new conditions. The same is true for the severe scenario. It will be shown later that in terms of volume of exports, the drop in South African exports is greater than the reduction in the world demand. Note also that for non-affected sectors, the decrease in FOB prices is essentially due to the decrease in the cost of trade and transportation margins. In the two scenarios, world prices of exports will increase by 2.1% in 2010 and resume their BAU level for the following years (up to 2015). This positive trajectory of world export prices nearly eliminates the effect of the preceding drop, but even in the long run FOB prices remain below their BAU level.

Table 6: Impact on export prices (% change from BAU)

COMMODITIES	INITIAL EXPORT SHARES	MODERATE				SEVERE			
		2008	2009	2010	2015	2008	2009	2010	2015
NON-AFFECTED	11.0	-0.9	-0.9	-0.4	-0.3	-3.2	-3.7	-1.4	-1.6
WEAKLY AFFECTED	9.0	-1.9	-1.7	-0.2	-0.1	-8.5	-8.7	-0.7	-0.5
MILDLY AFFECTED	31.8	-3.3	-2.1	-0.5	-0.3	-14.0	-13.9	-2.2	-2.1
STRONGLY AFFECTED	48.2	-4.0	-2.7	-0.3	-0.3	-16.6	-16.3	-1.6	-1.8
ALL	100.0	-3.3	-2.2	-0.4	-0.3	-13.6	-13.5	-1.7	-1.7

Tables 7 and 8 present the impact of the shocks on import prices and local domestic prices. The drop in the world price of imports will reduce the domestic cost of imported goods even if the reduction is, in percentage points, a little less than the reduction in world price. For the moderate scenario, it can be seen that import prices drop more than local prices for strongly and mildly affected sectors in 2008. We would expect for these sectors an increase in imports compared to domestic purchases. The opposite case is found for the weakly affected or non-affected sectors. It is important to note for the latter that there is a decrease in import prices due to margins.

Table 7: Impact on import prices (% change from BAU)

COMMODITIES	INITIAL IMPORT SHARES	MODERATE				SEVERE			
		2008	2009	2010	2015	2008	2009	2010	2015
NON-AFFECTED	4.1	-1.0	-0.8	-0.2	-0.1	-3.9	-3.9	-1.1	-0.7
WEAKLY AFFECTED	8.7	-2.3	-2.1	-0.2	-0.1	-10.4	-10.4	1.1	-0.5
MILDLY AFFECTED	32.4	-3.4	-1.6	-0.1	-0.1	-14.4	-14.4	-0.5	-0.3
STRONGLY AFFECTED	54.8	-4.5	-2.8	-0.1	-0.1	-17.8	-17.9	-0.6	-0.4
ALL	100.0	-3.8	-2.3	-0.1	-0.1	-15.5	-15.6	-0.6	-0.4

Table 8: Impact on local demand prices (% change from BAU)

COMMODITIES	INITIAL LOCAL DEMAND SHARES	MODERATE				SEVERE			
		2008	2009	2010	2015	2008	2009	2010	2015
NON-AFFECTED	5.1	-2.4	-2.0	-0.7	-0.4	-9.2	-10.0	-3.4	-2.2
WEAKLY AFFECTED	5.7	-2.4	-2.0	-0.6	-0.4	-9.7	-10.1	-2.8	-2.2
MILDLY AFFECTED	65.2	-2.9	-2.3	-0.6	-0.4	-11.6	-11.6	-2.9	-2.3
STRONGLY AFFECTED	11.5	-3.3	-2.2	-0.3	-0.2	-13.3	-13.0	-1.3	-1.3
ALL	100.0	-2.9	-2.3	-0.6	-0.4	-11.2	-11.3	-2.7	-2.3

## 2.2.2 Impact on exports, imports and local demand

As expected, results reported in Table 9 show that exports decrease strongly for products belonging to the strongly affected sectors and decrease deeply in the severe scenario. In 2008, at the beginning of the crisis, there is a decrease of 21.5% for strongly affected sectors in the severe scenario. The drop in world demand has a direct effect on exports, and the lower reduction in FOB prices with respect to world prices also reduces the performance of exports.

It is important here to understand the behaviour of the non-affected sectors. Globally speaking, they benefit from the difference between local prices (that are sharply decreasing) and export prices (that are hardly affected). The real exchange rate depreciates strongly and this movement favours only those exporting sectors that are not affected by the reduction in foreign demand and international prices. For instance, the gold sector, a non-affected sector, sees its volume of exports increasing by 3.1% in 2008 in the moderate scenario and by 10.6% in the severe scenario.

**Table 9: Impact on exports (% change from BAU)**

COMMODITIES	INITIAL EXPORTS SHARES	MODERATE				SEVERE			
		2008	2009	2010	2015	2008	2009	2010	2015
NON-AFFECTED	11.0	3.3	3.2	1.3	0.9	12.4	13.8	4.7	5.4
WEAKLY AFFECTED	9.0	-0.0	-0.6	0.8	0.3	-3.8	-3.2	3.3	2.2
MILDLY AFFECTED	31.8	-2.6	-1.1	-0.5	-0.9	-13.3	-14.6	-4.6	-5.0
STRONGLY AFFECTED	48.2	-5.2	-3.9	-0.9	-1.1	-21.5	-23.0	-7.0	-6.8
ALL	100.0	-3.0	-1.9	-0.4	-0.7	-13.6	-14.5	-4.0	-4.1

From Table 10, we also note a sharp decrease in imports. As will be shown later, total income of households will drop substantially, driving a huge reduction in total absorption and a reduction in demand for imported goods. In the moderate scenario this demand reduction is sufficient to compensate for the positive effect of lower import prices. Altogether imports fall by 2.1% in the strongly and mildly affected sectors. However, this decrease will be greater for non-affected and weakly affected sectors as the local price falls more than the import price. One should also keep in mind the constraint set on the current account balance, which is assumed to remain fixed relative to GDP. This assumption implies that if the country's exports decrease, then its imports would have to follow the same path.

**Table 10: Impact on imports (% change from BAU)**

COMMODITIES	INITIAL IMPORT SHARES	MODERATE				SEVERE			
		2008	2009	2010	2015	2008	2009	2010	2015
NON-AFFECTED	4.1	-2.5	-2.2	-0.8	-0.8	-10.2	-11.1	-4.8	-4.1
WEAKLY AFFECTED	8.7	-2.2	-1.6	-1.0	-1.1	-8.4	-9.3	-6.1	-5.5
MILDLY AFFECTED	32.4	-2.1	-2.2	-1.0	-1.1	-8.7	-9.6	-5.9	-5.7
STRONGLY AFFECTED	54.8	-2.1	-2.0	-1.1	-1.3	-9.3	-10.2	-6.4	-6.4
ALL	100.0	-2.1	-2.0	-1.0	-1.2	-9.1	-9.9	-6.2	-6.0

As explained previously, the contraction on the demand side translates into fewer imports. However, as shown in Table 11, this will affect domestic demand even more dramatically due to the increased competitiveness of foreign products created by the reduction in import prices.

**Table 11: Impact on local demand (% change from BAU)**

COMMODITIES	INITIAL LOCAL DEMAND SHARES	MODERATE				SEVERE			
		2008	2009	2010	2015	2008	2009	2010	2015
NON-AFFECTED	5.1	-1.1	-0.8	-0.3	-0.5	-4.8	-5.0	-2.5	-2.6
WEAKLY AFFECTED	5.7	-1.6	-1.4	-0.4	-0.7	-7.5	-7.9	-3.1	-3.2
MILDLY AFFECTED	65.2	-2.4	-1.9	-0.8	-1.0	-10.3	-10.2	-5.1	-5.0
STRONGLY AFFECTED	11.5	-3.1	-2.4	-0.8	-1.0	-13.0	-14.1	-5.4	-5.2
ALL	100.0	-2.4	-1.9	-0.7	-0.9	-10.3	-11.2	-4.9	-4.7

The decrease in the total demand for goods will have consequences for sectoral production. One would actually expect sectoral production to decrease most strongly for sectors strongly dependent on exports. On the other hand, sectors that are not directly affected by the crisis might be affected by a reduction in demand from other sectors, for instance in terms of intermediate consumption. This is the case for all transport and trade sectors.

### 2.2.3 Impact on production

The decrease in the production of most of the sectors will have a number of consequences. Primarily firms that see their exports and production fall will retrench workers as they are unable to adjust the nominal wage of labour. Thus, we expect labour demand to be reduced. We will have to focus on the composition of the labour force for specific sectors to analyse which category of workers will be vulnerable. Moreover, we know that firms will decrease their labour demand and will simultaneously decrease their demand for intermediate consumption given the reduction in the level of activity. Therefore, some sectors (not directly influenced) will actually be indirectly affected by the decrease in intermediate consumption of the strongly affected sectors. Tables 12 summarises these effects on the sectors for the two scenarios.

**Table 12: Impact on production (% change from BAU)**

COMMODITIES	INITIAL OUTPUT SHARES	MODERATE				SEVERE			
		2008	2009	2010	2015	2008	2009	2010	2015
NON-AFFECTED*	6.2	-0.0	-0.2	0.1	-0.2	-0.5	-0.3	-0.7	-0.5
WEAKLY AFFECTED	6.2	-1.3	-1.2	-0.2	-0.5	-6.8	-7.0	-1.9	-2.1
MILDLY AFFECTED	59.5	-2.4	-1.8	-0.8	-1.0	-10.6	-11.5	-5.1	-5.0
STRONGLY AFFECTED	17.0	-3.8	-2.9	-0.9	-1.1	-15.8	-17.1	-6.0	-5.8
ALL	100.0	-2.4	-1.9	-0.7	-0.9	-10.7	-11.6	-4.7	-4.7

\* Note here that we have a difference in this group between gold and the rest. Indeed, gold production increases. This sector does not depend on local purchases, thus it does not face a decrease in local demand. For food and beverage, their production decreases due to the decline in local demand (households).

### 2.2.4 Impact on labour demand, unemployment rates and wages

We have seen so far that exports, imports and production are falling. Due to the downward rigidity of nominal wages, firms will adjust to the reduction in demand by laying off workers. As unions are strong, producers will not be able to decrease wage rates to adjust to the falling demand, so they will have to retrench more workers. Indeed Table 13 shows the corresponding declines in labour demand.

Table 13: Impact on labour demand (% change from BAU)

COMMODITIES	INITIAL LABOUR DEMAND SHARES	MODERATE				SEVERE			
		2008	2009	2010	2015	2008	2009	2010	2015
NON-AFFECTED	4.7	1.1	1.1	0.3	0.7	3.1	2.3	-2.1	3.9
WEAKLY AFFECTED	4.4	-2.4	-2.5	-0.5	-0.5	-12.2	-13.3	-4.7	-2.3
MILDLY AFFECTED	55.7	-5.5	-3.8	-1.0	-0.8	-23.3	-23.9	-8.3	-4.2
STRONGLY AFFECTED	9.0	-9.5	-6.1	-0.4	-0.8	-37.3	-36.8	-6.2	-7.8
ALL	73.7	-4.7	-3.3	-0.8	-0.7	-20.1	-20.7	-6.8	-3.8

All sectors except the non-affected retrench workers. Non-affected sectors, and notably the gold sector, benefit from the crisis. We saw earlier that its production was increasing, and this is only possible by increasing the number of workers.

The process of retrenchments will not be uniform across the different labour categories (Table 14). Highly skilled workers are the ones who suffer the shortest from the crisis. Although there were significant job losses during 2008 and 2009 (and during 2010 for the severe scenario), the economy in particular faced a rapid shortage of skilled workers. These findings accurately reflect the perceived reality in South Africa.

Table 14: Impact on total labour demand (% change from BAU)

YEARS	HIGHLY SKILLED		SKILLED AND SEMI-SKILLED		LOW SKILLED	
	MODERATE	SEVERE	MODERATE	SEVERE	MODERATE	SEVERE
2008	-4.40	-20.73	-4.90	-19.57	-5.86	-23.87
2009	-2.36	-20.82	-3.96	-20.50	-4.23	-24.65
2010	0	-5.49	-1.33	-7.86	-1.04	-8.24
2015	0	0	-1.21	-6.59	-0.99	-5.28

For each labour category in the BAU, we observed that unemployment is decreasing due to the fact that capital grows faster than labour, and that labour is becoming increasingly efficient in the economy. Results reported in Table 15 show that for highly skilled workers only, in the base year, the unemployment rate was very low (1%) and actually decreased in the BAU to reach 0% in 2007. In 2009, in the severe scenario, the unemployment rate for skilled workers reached slightly more than 20%.

Table 15: Unemployment rate (%)

YEARS	HIGH SKILLED		SKILLED AND SEMI-SKILLED		LOW SKILLED*	
	MODERATE	SEVERE	MODERATE	SEVERE	MODERATE	SEVERE
2005	1.00	1.00	15.00	15	26.4	26.4
2008	4.40	20.73	17.18	29.96	28.16	41.90
2009	2.36	20.82	15.50	30.05	26.07	41.83
2010	0.0	5.49	12.23	18.04	22.73	28.36
2015	0.0	0.0	7.02	12.08	18.42	21.96

\* In the CGE model, we assume that the substitution between low skilled and informal is very low (i.e. 0.1 which is almost a Leontief combination between them). Thus, formal sector workers who lose their jobs would find it difficult in the short to medium term to enter the informal sector, as this requires new skills and access to markets. Transitions directly from the formal to the informal sector are limited. In the longer run it may be more likely that formal sector workers who have become unemployed would move into informal jobs. However, growth of the informal sector remains limited, perhaps because many households have alternative income sources, e.g. from grants.

Recall that there are actually four types of labour in the model, the three described above and informal labour. Assuming no unemployment of informal labour, the impact of the crisis for this type of labour will be on their wage rate<sup>13</sup> which falls sharply.

**Table 16: Impact on high skilled and informal wage rate (%) (% change from BAU)**

YEARS	HIGH SKILLED		INFORMAL	
	MODERATE	SEVERE	MODERATE	SEVERE
2008	1.38	1.38	-5.00	-21.10
2009	2.48	2.48	-3.68	-21.85
2010	-1.68	-3.61	-0.97	-7.64
2015	-1.46	-7.99	-0.77	-4.24

It is not surprising to see a decrease in the rate of return of capital in most sectors as depicted in Table 17. Thus, one would expect negative impacts on household incomes, and even more on firm incomes since firms rely mainly on capital.

**Table 17: Impact on rate of return to capital (% change from BAU)**

COMMODITIES	INITIAL RATE OF RETURN SHARES	MODERATE				SEVERE			
		2008	2009	2010	2015	2008	2009	2010	2015
NON-AFFECTED	4.1	-1.3	-1.8	-1.1	-0.3	-4.6	-7.2	-7.0	-1.9
WEAKLY AFFECTED	5.3	-1.7	-2.1	-0.7	-0.4	-7.7	-9.0	-4.1	-2.1
MILDLY AFFECTED	71.3	-4.0	-3.1	-0.9	-0.4	-16.0	-15.9	-4.9	-2.7
STRONGLY AFFECTED	15.8	-6.2	-3.9	0.0	-0.2	-25.0	-23.1	-0.9	-1.6
ALL	100	-4.5	-3.4	-0.8	-0.4	-17.9	-17.8	-4.7	-2.7

Taking these results into account, we can now analyse what happens to the different agents following the crisis.

## 2.2.5 Impact on institutions

### Firms

As mentioned previously, the rate of return for capital is sharply decreasing. Firm income is thus strongly affected as this component represents 88% of their total income (Table 18). Moreover, one of the channels through which the crisis operates is modelled as a decrease in transfers from abroad. Thus, we expect their income to decrease strongly. Firm income decreases by 16% in 2008 in the severe scenario, and even in the long run it cannot return to its BAU level.

13. Wages and earnings in the informal sector are both referred to as wages in the text.

Table 18: Impact on firms (% change from BAU)

YEARS	CAPITAL INCOME		TRANSFER INCOME		TOTAL INCOME		SAVINGS	
	MODERATE	SEVERE	MODERATE	SEVERE	MODERATE	SEVERE	MODERATE	SEVERE
2008	-4.53	-17.94	-1.87	-3.73	-4.23	-16.34	-4.17	-16.06
2009	-3.72	-18.74	-2.22	-4.06	-3.55	-17.11	-3.52	-16.82
2010	-1.35	-7.24	-1.83	-4.06	-1.40	-6.89	-1.41	-6.83
2015	-1.45	-7.66	-1.83	-4.06	-1.49	-7.30	-1.50	-7.24

Firm savings are obtained after removing taxes to government and transfers paid to other institutions (mainly households and the rest of the world) from their income. As seen in Table 18, there is a dramatic fall in firm saving which is more pronounced in the short run. This decrease in firm savings will have important consequences for total investment. Indeed, firm savings represent 80.5% of total investment. Here again, we can see that, even in the moderate scenario, the effect of the crisis remains in the long run as firm savings remains below their BAU level (-1.5%).

### Households

Households receive income from labour and transfers from firms, government and the rest of the world. We assume that transfers from government and the rest of the world are fixed, whereas transfers from firms are a proportion of firm income.

As shown in Table 19, unemployment rises for all labour categories and labour demand decreases. As household income is mainly based on labour income, we expect it to decrease. Moreover, as mentioned previously, firm income is decreasing and so are the dividends it pays. Thus, household income decreases sharply in both scenarios. This decrease negatively affects household consumption and savings and thus total absorption through a reduction in consumption and investment.

Table 19: Impact on households (% change from BAU)

YEARS	LABOUR INCOME		TRANSFER INCOME*		TOTAL INCOME		SAVINGS		CONSUMPTION	
	MODERATE	SEVERE	MODERATE	SEVERE	MODERATE	SEVERE	MODERATE	SEVERE	MODERATE	SEVERE
2008	-5.4	-21.36	-3.43	-13.19	-4.64	-18.24	-4.83	-18.85	-4.62	-18.16
2009	-4.29	-22.26	-2.90	-13.86	-3.76	-19.04	-3.94	-19.69	-3.74	-18.96
2010	-1.37	-8.29	-1.17	-5.64	-1.29	-7.27	-1.38	-7.60	-1.28	-7.24
2015	-1.23	-6.67	-1.26	-6.08	-1.24	-6.44	-1.33	-6.87	-1.23	-6.40

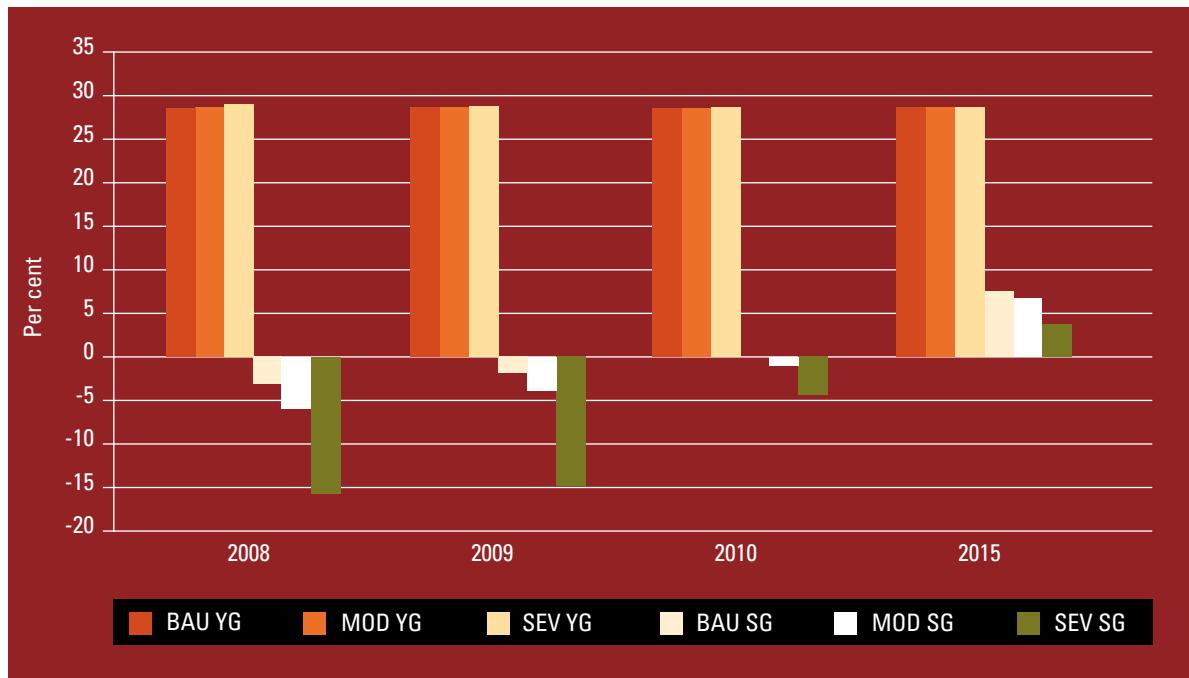
\* Note that transfers to households are composed of transfers from firms, government and rest of the world. Transfers from firms are a share of firms' income and this is decreasing. Transfers from government and the rest of the world are fixed. Thus transfer income in Table 19 is essentially income from dividends.

### Government

Government revenue is expected to decrease. Indeed, direct taxes are decreasing (as a share of households and firm income), and taxes on products are also decreasing for most sectors (due to the decreases in imports and production). Half of government income comes from direct taxes and around a third from indirect taxes on products. Thus one can expect its revenue to decrease.

Figure 9 represents the variations of the share of government income in GDP as well as government savings as a percentage of GDP for the BAU and both scenarios.

Figure 9: Revenue/GDP and Savings/GDP for government



In the BAU, government income/GDP is around 28%. This share increases in the scenarios due to the huge drop of GDP. Regarding savings over GDP, in the BAU in 2008, the deficit represents 3% of GDP, and without any shock, the deficit would decrease to reach a surplus in 2015. Note that in the base year, the deficit is quite low, and then there is a decrease in prices in the BAU (as the economy is becoming more and more efficient through time). It is therefore easy to understand why government savings become positive in the long run.

Of course, with the crisis we do not observe the same pattern in the short run. Indeed, the deficit reaches 15% of GDP in 2008 and 2009 in the severe scenario, and around 5% for the moderate scenario. In the long run, the situation improves somewhat but remains far behind the BAU situation.

#### 2.2.6 Impact on total investment and GDP

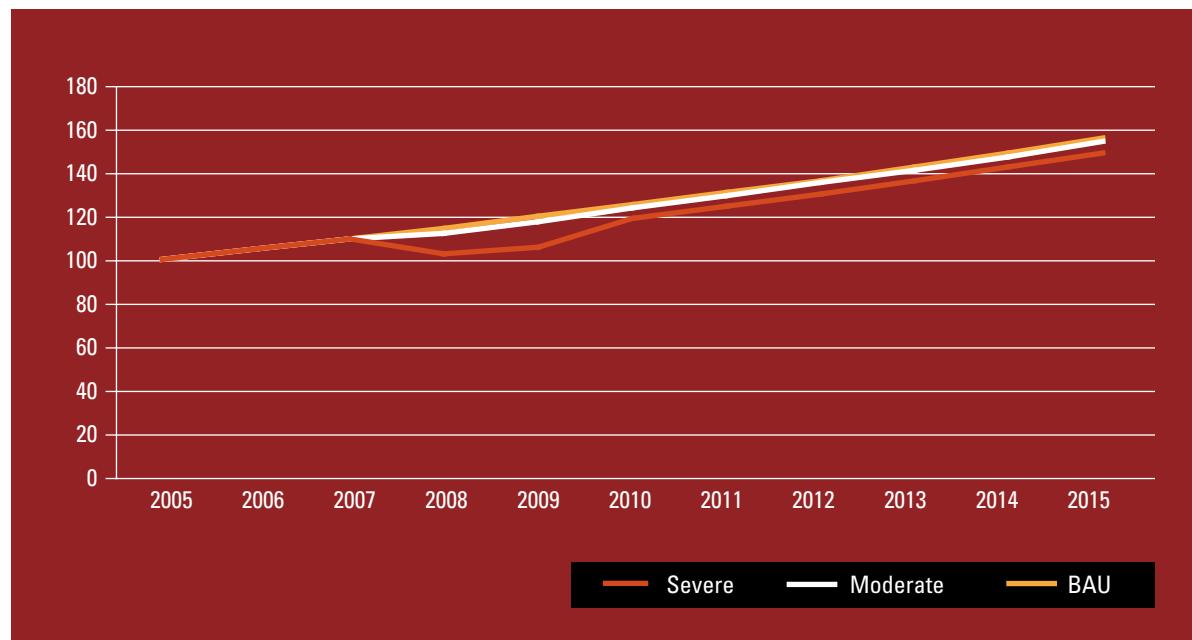
Given all the preceding impacts it is no surprise to observe a huge decrease in total investment (Table 20). What is relevant to note here is that even though the crisis is in effect only in 2008 and 2009 and the recovery starts in 2010, impacts on investment remain in the long run. Indeed, under both scenarios one still observes lower investment in 2015 than under the BAU.

Table 20: Impact on investment (in %) (% change from BAU)

YEARS	TOTAL INVESTMENT (VALUE)		PRIVATE INVESTMENT (VALUE)		PRIVATE INVESTMENT (VOLUME)	
	MODERATE	SEVERE	MODERATE	SEVERE	MODERATE	SEVERE
2008	-6.16	-23.94	-6.00	-23.49	-2.64	-11.20
2009	-5.03	-24.91	-4.99	-24.54	-2.62	-12.47
2010	-1.90	-9.61	-1.99	-10.00	-1.57	-8.21
2015	-1.93	-9.48	-2.03	-9.90	-1.78	-8.48

Now focusing on GDP, we know that the South African projections for GDP were around 4.5% growth per year. The world economic crisis produces a huge drop in GDP (Figure 10). For both scenarios GDP falls in 2008 and 2009 and then increases again, but it does not return to its BAU value even by 2015. In other words, without positive shocks or deliberate and

Figure 10: Evolution of Real GDP in BAU, moderate and severe scenarios



successful government interventions that stimulate the economy and counteract the negative impact of the world crisis, GDP will not recover to what it would have been in the absence of the crisis, under the BAU scenario.

### 2.3 Concluding remarks on economy-wide impacts

As expected, the effects of the world economic crisis on the South African economy are really harsh even in the moderate scenario. Indeed, the decrease in world prices combined with the drop in world demand leads to a fall in production for most sectors. This reduces employment and unemployment rates increase. Households see their income drop, and the situation is worse for informal workers that do not have the protection of an effective wage floor that unions provide. They face a huge drop in their wage rate (earnings). Firms also suffer from the crisis as their income and savings decrease strongly.

A relevant fact to note is that even if the crisis only lasts for two years (2008 and 2009), its effects remain in the long run, notably due to the permanent impact of the drop in investment.

### **3. Extrapolating from the macroeconomic impacts to child poverty**

#### **3.1 Background**

The previous sections set out the situation regarding child poverty in South Africa and explained the results of the economy-wide modelling to estimate the economic impact of the international economic crisis. These economic impacts have been used in conjunction with a micro-model of the economy to estimate the likely impact of the economic crisis on child poverty in South Africa. This section reports on these findings.

#### **3.2 Brief overview of data, assumptions and methodology for the micro-model<sup>14</sup>**

Essentially, the major purpose of the micro-modelling was to estimate the impact of the economic changes simulated by the CGE model on households. Essentially, three channels were modelled here:

- Changes in prices which were taken to apply across the board to all households, the differences arising only from the composition of their spending, though initial prices have been estimated by cluster (area), thus implying that different incomes were required to reach the poverty line in different clusters, given the different prices faced. (Note that adult equivalence scales were also applied to allow for the differential food needs of different individuals in a household, by age and gender; see the full methodological note in Appendix B and C for more details.)
- Changes in wages in different skilled categories (the CGE models allows for four types of labour, three of these reflecting differences in the skills composition, the fourth the informal labour market).
- Changes in employment for the three formal labour market categories. (It was assumed here that formal sector workers who lose their jobs do not revert to the informal sector but become unemployed.)

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14. The methodology used here was heavily influenced by participation in a workshop in Accra, Ghana, and by advice rendered by members of the Poverty and Economic Policy (PEP) network. See in particular for the microeconomic approach the two forthcoming papers: Cockburn, J., I. Fofana and L. Tiberti, "The Impact of the Global Crisis on Child Poverty in West and Central Africa", forthcoming as PEP ([www.pep-net.org](http://www.pep-net.org)) and Innocenti (<http://www.unicef-irc.org/>) working papers; Bibi, S., J. Cockburn, I. Fofana and L. Tiberti, "Impacts of the Global Crisis and Policy Responses on Child Welfare: A Macro-Micro Simulation Framework", forthcoming as PEP ([www.pep-net.org](http://www.pep-net.org)) and Innocenti (<http://www.unicef-irc.org/>) working papers.

A possible fourth channel was not modelled, viz. possible changes in non-labour earnings on household poverty. Other than grants, non-labour earnings are uncommon amongst poorer segments of South African society, and simulating changes in such income components requires detailed information on assets and risks which are difficult to come by. Moreover, other models of this nature have followed a similar approach to that taken here.

As has been shown in the previous sections, price and wage changes are relatively small and the poverty analysis shows that they have little impact on poverty. By far the major impact on poverty comes from the changes in employment. For this reason, much of the modelling attention had to be focused here. Probit models of the probability of employment for each employed and unemployed worker for jobs in various skills categories were estimated. These models were then used to identify those employed workers in each skill category most likely to lose their jobs when employment declines relative to the labour force. A similar procedure was used to determine the likely beneficiaries of new jobs and the wages of those who may gain jobs once economic growth returns. However, because of the poor fit of the wage estimates within skills categories, the wages of employed workers were assumed to remain as they had been recorded, rather than giving them the estimated wage from the wage equations, as is often done in such micro-simulations.

The dataset used for the micro-simulations was the 2008 National Income Dynamics Survey (NIDS), rather than the bigger 2005 Income and Expenditure Survey (IES), because the former contains both consumption data and labour market information. The 2008 data was taken to approximately reflect the 2007 situation before the crisis, and the modelling was then applied to these data to arrive at simulations. Because the micro-simulations essentially deal with a static model, projections were not attempted beyond 2011. As will be shown, by that time poverty would have returned to its usual course under the moderate scenario, and would have almost returned to initial levels in the severe scenario. Based on the macro-projections of growth, which envisage a further return to closer to the BAU by 2015, it is fairly certain that the course of poverty will edge closer to the BAU beyond 2011.

### 3.3 Results of the micro-model

#### 3.3.1 Broad trends

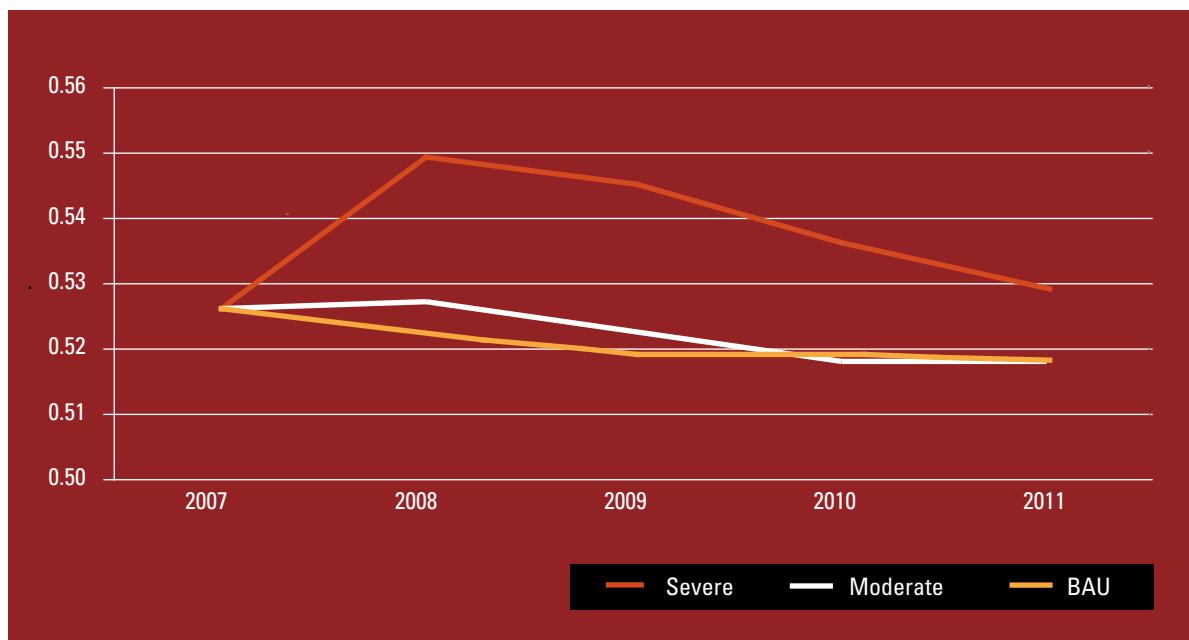
Child poverty in 2007, that is before the crisis, was estimated at 52.6% using the moderately low poverty line of R250 *per capita* per month in 2000 Rand terms or R377 in January 2008 (to apply to the NIDS data).<sup>15</sup> In the absence of an economic crisis, this headcount rate of child poverty would be declining by a small percentage every year based on linking the macro and the micro-simulations. In 2008 it would have declined to 52.2%, in 2009 to 51.9%, in 2010 it would have remained at 51.9%, and by 2011 it would have declined to 51.8% according to the BAU simulations. Thus, BAU would have meant a slow but continuing decline in child poverty, as indeed for poverty in the whole society (poverty of individuals was estimated to decline from 46.8% to 45.9% from 2007 to 2011).

One should compare the impact of the international economic crisis against the initial child poverty levels and also against the BAU, i.e. the natural trend of the economy and economic policy. As indicated in the previous section, this paper allows for two scenarios: a moderate crisis scenario in which the economic crisis is soon left behind and the economy recuperates well, and a severe crisis scenario in which the effect of the international crisis lasts longer and it takes longer for the South African economy to recover. The most severe effects of the crisis are in 2008 and 2009, while by 2010 some of the impacts on poverty are already partly being reversed, even under a severe scenario.

15. This is a poverty line often quoted in the literature. The "lower bound" poverty line of Statistics South Africa of R322 quoted by Woolard & Leibbrandt (2006) and derived by Hoogeveen & Ozler is some 30% higher, and the "upper bound" one at R593 *per capita* per month in 2000 some 140% higher.

The overall trends under the different scenarios are summarised in Table 21. Figure 11 shows the trends in the poverty headcount ratio for the period 2007 to 2011 for each of the three scenarios. The choice of scale is intended to allow a visual inspection of the different impacts, but note that the range covered here is fairly small. However, it accentuates the stark difference between the severe and moderate scenarios, though even under the severe scenario the headcount ratio declines by 2011 to not much higher than its initial level in 2007.

**Figure 11: The poverty headcount ratio ( $P_0$ ) for 2007 to 2011 under three scenarios: BAU, moderate scenario and severe scenario**



The impact of the moderate scenario for the crisis on the child poverty headcount is quite small in 2008 if one focuses on the headcount ratio only and uses this slightly below conventional poverty line.<sup>16</sup> The child poverty headcount ratio ( $P_0$ ) hardly increases (by 0.1 percentage points or 0.2% only); in contrast, there is a 12% increase in the child poverty gap ratio ( $P_1$ ) and a 28% increase in the child poverty severity ratio ( $P_2$ ).

This indicates that many of the changes in the economic situation in 2008 under the moderate scenario occur at lower levels of income, i.e. quite some way below the poverty line. Thus those deepest in poverty are also most affected. Under this moderate scenario, child poverty actually starts improving in 2009, i.e. the headcount ratio drops to 52.2%, only 0.3% above the level of poverty that would have applied under the BAU scenario and below the initial poverty headcount ratio. Yet some impact on the poverty gap ratio as well as the poverty severity ratio for children remains. This indicates that though fewer children are in poverty than in 2007, the changes at the bottom of the distribution have worsened the situation for the worst off children. If the poverty line had therefore been drawn at a lower level, the poverty headcount also would have risen.

In 2010 there is further moderation of the poverty headcount, but now the poverty gap ratio and the poverty severity ratio also improves relative to 2007.

We turn now to the more severe economic growth scenario. In this case, the child poverty headcount ratio would rise by 4.4% (2.3 percentage points) to 54.9% in 2008 relative to 2007, the poverty gap ratio by 43%, and the poverty severity ratio by 94%. This again illustrates

16. In practice, poverty lines are derived in this model for each cluster of households in the sample, considering price levels in their area as reflected in the consumption patterns. The *per capita* lines mentioned here are those derived directly from the data without considering prices, by determining what poverty line would give the same child poverty headcount ratio.

Table 21: Trends in poverty under three scenarios, 2007-2011

		BAU	% CHANGE (RELATIVE TO 2007)	MODERATE SCENARIO	% CHANGE (RELATIVE TO 2007)	SEVERE SCENARIO	% CHANGE (RELATIVE TO 2007)	
2007	INDIVIDUAL LEVEL	Po	0.468	0.0%				
		P1	0.183	0.0%				
		P2	0.095	0.0%				
	HOUSEHOLD LEVEL	Po	0.362	0.0%				
		P1	0.130	0.0%				
		P2	0.064	0.0%				
	CHILD LEVEL	Po	0.526	0.0%				
		P1	0.205	0.0%				
		P2	0.107	0.0%				
2008	INDIVIDUAL LEVEL	Po	0.463	-1.1%	0.471	0.6%	0.508	8.5%
		P1	0.182	-0.5%	0.208	13.7%	0.287	56.8%
		P2	0.095	0.0%	0.125	31.6%	0.212	123.2%
	HOUSEHOLD LEVEL	Po	0.359	-0.8%	0.366	1.1%	0.393	8.6%
		P1	0.129	-0.8%	0.148	13.8%	0.204	56.9%
		P2	0.064	0.0%	0.084	31.3%	0.146	128.1%
	CHILD LEVEL	Po	0.522	-0.8%	0.527	0.2%	0.549	4.4%
		P1	0.205	0.0%	0.230	12.2%	0.294	43.4%
		P2	0.106	-0.9%	0.137	28.0%	0.208	94.4%
2009	INDIVIDUAL LEVEL	Po	0.462	-1.3%	0.465	-0.6%	0.510	9.0%
		P1	0.182	-0.5%	0.197	7.7%	0.287	56.8%
		P2	0.095	0.0%	0.113	18.9%	0.212	123.2%
	HOUSEHOLD LEVEL	Po	0.358	-1.1%	0.360	-0.6%	0.392	8.3%
		P1	0.129	-0.8%	0.140	7.7%	0.204	56.9%
		P2	0.064	0.0%	0.076	18.8%	0.147	129.7%
	CHILD LEVEL	Po	0.519	-1.3%	0.522	-0.8%	0.545	3.6%
		P1	0.204	-0.5%	0.219	6.8%	0.304	48.3%
		P2	0.106	-0.9%	0.125	16.8%	0.215	100.9%
2010	INDIVIDUAL LEVEL	Po	0.462	-1.3%	0.460	-1.7%	0.479	2.4%
		P1	0.181	-1.1%	0.181	-1.1%	0.216	18.0%
		P2	0.094	-1.1%	0.094	-1.1%	0.133	40.0%
	HOUSEHOLD LEVEL	Po	0.358	-1.1%	0.356	-1.7%	0.371	2.5%
		P1	0.128	-1.5%	0.128	-1.5%	0.154	18.5%
		P2	0.063	-1.6%	0.063	-1.6%	0.090	40.6%
	CHILD LEVEL	Po	0.519	-1.3%	0.518	-1.5%	0.536	1.9%
		P1	0.203	-1.0%	0.203	-1.0%	0.238	16.1%
		P2	0.105	-1.9%	0.105	-1.9%	0.145	35.5%
2011	INDIVIDUAL LEVEL	Po	0.459	-1.9%	0.460	-1.7%	0.472	0.9%
		P1	0.179	-2.2%	0.180	-1.6%	0.206	12.6%
		P2	0.093	-2.1%	0.094	-1.1%	0.122	28.4%
	HOUSEHOLD LEVEL	Po	0.355	-1.9%	0.355	-1.9%	0.366	1.1%
		P1	0.127	-2.3%	0.128	-1.5%	0.146	12.3%
		P2	0.063	-1.6%	0.063	-1.6%	0.082	28.1%
	CHILD LEVEL	Po	0.518	-1.5%	0.518	-1.5%	0.529	0.6%
		P1	0.201	-2.0%	0.202	-1.5%	0.228	11.2%
		P2	0.104	-2.8%	0.104	-2.8%	0.135	26.2%

Note: % change is shown relative to BAU in 2007

Source: Own projections

the severe consequences for children at the bottom of the income distribution, i.e. far below conventionally used poverty lines. Clearly, under the severe economic scenario, very poor children are greatly affected by the effect of the crisis in 2008. In 2009, there is little further change in the poverty figures in terms of the three conventional measures used here: the severity of the continuing recession means that the natural improving trend in poverty is largely cancelled out. The poverty situation has become slightly less severe in terms of the poverty headcount, which is now only 3.6% worse than was the case in 2007, but poverty in terms of the more poverty sensitive measures still increases, with the effect that the poverty gap ratio has risen by almost half while the poverty severity ratio has doubled.

However, compared to BAU the backlog still grows, leaving a greater gap to negotiate to get back on trend.

By 2011 the poverty headcount ratio under this severe economic growth impact scenario has returned almost to its original levels, being only 0.6% above where it was in 2007, while the poverty gap ratio  $P_1$  has risen by 11% and the poverty severity ratio  $P_2$  by 26%. Thus even under the severe scenario, the impact of the economic crisis would have been sharply reduced by 2011, except at the very bottom of the income distribution.

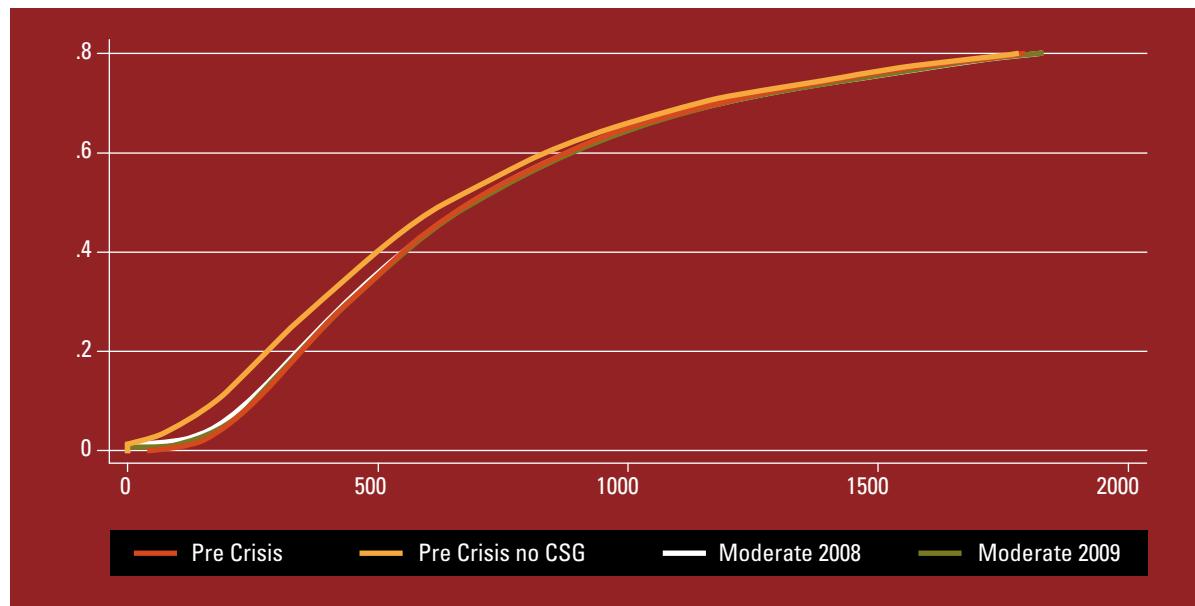
### 3.3.2 Poverty dominance

Figure 12 shows the effect of the moderate scenario in 2008 and 2009 against the initial situation in terms of cumulative density functions (CDFs). As discussed earlier, if one CDF line lies clearly above another, poverty by any of the conventional measures is higher irrespective of the poverty line chosen. Such a situation is referred to as stochastic poverty dominance. The three lines depicting the initial situation and the moderate scenarios in 2008 and 2009 are barely distinguishable, except at the very lowest income levels, where there is clear poverty dominance. These scenarios show relatively small changes which would probably fall within the 95% confidence levels of the initial cumulative density function. In contrast to that, the situation in terms of child poverty would have been much worse if there had been no Child Support Grant: the line depicting that situation lies well above all the other three lines. Thus the moderate scenario for the economic crisis shows an impact that is far too small to undo the beneficial effects for children of the earlier introduction and expansion of the Child Support Grant.

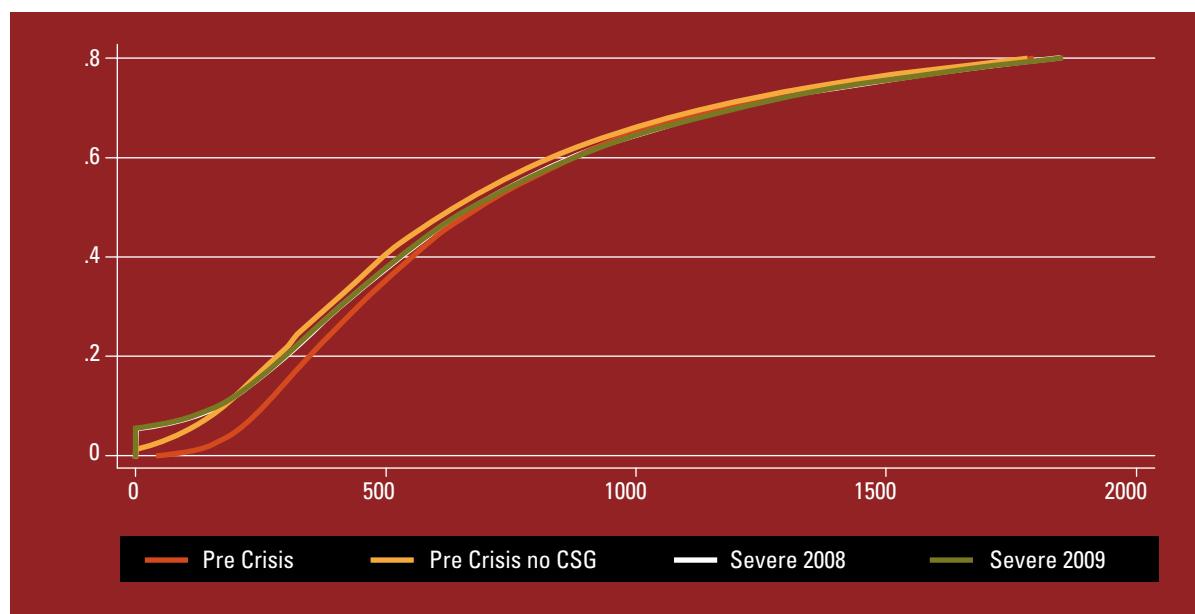
Figure 13 shows the CDFs that compare the 2007 situation with the impact of the severe scenario in 2008 and 2009. Here the impact of the crisis is much clearer and there appears to be complete poverty dominance. Irrespective of the poverty measure or poverty line chosen, except for very high poverty lines, there is a large (and probably statistically significant) effect on poverty. Among the very poor it is even larger than the beneficial effects of the Child Support Grant had been.

In summary, the cumulative density functions indicate that the effect of the moderate scenario is not all that large. In contrast, the impact of the severe scenario is large, particularly at the lower levels; clearly we are dealing here with poverty impacts which most affect the poorest.

**Figure 12: Cumulative density functions (curves) for child poverty in 2007, 2008 and 2009 under a moderate scenario, and a comparison with the beneficial effects of the Child Support Grant**



**Figure 13: Cumulative density functions (curves) for child poverty in 2007, 2008 and 2009 under a severe scenario, and a comparison with the beneficial effects of the Child Support Grant**



### 3.3.3 Comparing two poverty lines

Table 22 shows the differences in results using two alternative poverty lines. This confirms what the CDFs and the magnitude of the impacts on P1 and P2 relative to Po have already intimated that the major impact of the crisis is closer to the bottom of the income distribution. For the lower of the two poverty lines shown here,<sup>17</sup> the impact of the severe scenario is to increase the poverty headcount ratio by 16.8% in 2008 rather than by the 4.4% estimated using the higher poverty line; the poverty severity ratio rises by 195% rather than 94%.

17. This line is equivalent to a poverty line of R247 *per capita* per month in January 2008, or R163 *per capita* per month in 2000 Rand, compared to the higher poverty line that is R250 *per capita* per month in 2000 Rand.

**Table 22: Child poverty scenarios (moderate impact and severe impact of crisis) at two poverty lines, 2007–2011, compared to BAU in 2007**

	HIGHER POVERTY LINE	% CHANGE FROM BAU	LOWER POVERTY LINE	% CHANGE FROM BAU
2007 BAU	Po	0.526	0.0%	0.364
	P1	0.205	0.0%	0.119
	P2	0.107	0.0%	0.055
MODERATE SCENARIO 2008	Po	0.527	0.2%	0.376
	P1	0.230	12.2%	0.149
	P2	0.137	28.0%	0.088
MODERATE SCENARIO 2009	Po	0.522	-0.8%	0.369
	P1	0.219	6.8%	0.136
	P2	0.125	16.8%	0.076
MODERATE SCENARIO 2010	Po	0.518	-1.5%	0.357
	P1	0.203	-1.0%	0.117
	P2	0.105	-1.9%	0.054
MODERATE SCENARIO 2011	Po	0.518	-1.5%	0.354
	P1	0.202	-1.5%	0.117
	P2	0.104	-2.8%	0.054
SEVERE SCENARIO 2008	Po	0.549	4.4%	0.425
	P1	0.294	43.4%	0.222
	P2	0.208	94.4%	0.162
SEVERE SCENARIO 2009	Po	0.545	3.6%	0.424
	P1	0.304	48.3%	0.221
	P2	0.215	100.9%	0.162
SEVERE SCENARIO 2010	Po	0.536	1.9%	0.386
	P1	0.238	16.1%	0.158
	P2	0.145	35.5%	0.095
SEVERE SCENARIO 2011	Po	0.529	0.6%	0.376
	P1	0.228	11.2%	0.147
	P2	0.135	26.2%	0.086

Note: The higher poverty line is the one used throughout the text, equivalent to about R250 in 2 000 Rand terms. The lower poverty line is equivalent to a *per capita* poverty line of R247 per month in January 2008, or R163 *per capita* per month in 2 000 Rand.

### 3.3.4 Urban versus rural poverty

Another way of looking at this is to also separate out the impacts on child poverty in urban and rural areas. Poverty amongst children is more severe in rural than in urban areas. In 2007 before the crisis, poverty amongst children in urban areas was 44.9% versus 58.7% in rural areas. Given differential price effects, there appears to be a smaller difference at the lowest level, indicating that urban children generally face higher price levels which increases poverty in these areas relative to poverty in rural areas, given reigning price differentials.

Table 23: Trends in poverty under three scenarios in urban and rural areas, 2007–2011

		BAU			MODERATE			SEVERE			
		ALL	URBAN	RURAL	ALL	URBAN	RURAL	ALL	URBAN	RURAL	
		Po	P1	P2	Po	P1	P2	Po	P1	P2	
2007	INDIVIDUAL LEVEL	Po	0.468	0.392	0.553						
		P1	0.183	0.163	0.205						
		P2	0.095	0.088	0.104						
	HOUSEHOLD LEVEL	Po	0.362	0.296	0.459						
		P1	0.130	0.114	0.154						
		P2	0.064	0.058	0.073						
	CHILD LEVEL	Po	0.526	0.449	0.587						
		P1	0.205	0.191	0.216						
		P2	0.107	0.103	0.110						
2008	INDIVIDUAL LEVEL	Po	0.463	0.390	0.546	0.471	0.389	0.564	0.508	0.425	0.600
		P1	0.182	0.162	0.205	0.208	0.166	0.254	0.287	0.227	0.354
		P2	0.095	0.087	0.104	0.125	0.091	0.162	0.212	0.156	0.275
	HOUSEHOLD LEVEL	Po	0.359	0.295	0.453	0.366	0.296	0.468	0.393	0.321	0.498
		P1	0.129	0.113	0.154	0.148	0.119	0.190	0.204	0.164	0.264
		P2	0.064	0.058	0.073	0.084	0.064	0.114	0.146	0.112	0.197
	CHILD LEVEL	Po	0.522	0.448	0.581	0.527	0.445	0.593	0.549	0.488	0.598
		P1	0.205	0.190	0.216	0.230	0.190	0.263	0.294	0.243	0.335
		P2	0.106	0.102	0.100	0.137	0.102	0.166	0.208	0.154	0.252
2009	INDIVIDUAL LEVEL	Po	0.462	0.387	0.546	0.465	0.386	0.553	0.510	0.425	0.599
		P1	0.182	0.162	0.205	0.197	0.164	0.234	0.287	0.227	0.353
		P2	0.095	0.087	0.104	0.113	0.089	0.140	0.212	0.156	0.275
	HOUSEHOLD LEVEL	Po	0.358	0.293	0.453	0.360	0.294	0.457	0.392	0.321	0.496
		P1	0.129	0.112	0.153	0.140	0.116	0.174	0.204	0.164	0.264
		P2	0.064	0.058	0.073	0.076	0.062	0.097	0.147	0.112	0.197
	CHILD LEVEL	Po	0.519	0.442	0.581	0.522	0.445	0.584	0.545	0.506	0.630
		P1	0.204	0.189	0.216	0.219	0.189	0.243	0.304	0.251	0.346
		P2	0.106	0.102	0.109	0.125	0.101	0.144	0.215	0.160	0.259
2010	INDIVIDUAL LEVEL	Po	0.462	0.386	0.546	0.460	0.386	0.543	0.479	0.398	0.568
		P1	0.181	0.160	0.205	0.181	0.161	0.203	0.216	0.178	0.259
		P2	0.094	0.086	0.104	0.094	0.086	0.103	0.133	0.104	0.166
	HOUSEHOLD LEVEL	Po	0.358	0.292	0.453	0.356	0.292	0.450	0.371	0.302	0.472
		P1	0.128	0.111	0.154	0.128	0.112	0.152	0.154	0.126	0.195
		P2	0.063	0.057	0.073	0.063	0.057	0.072	0.090	0.071	0.118
	CHILD LEVEL	Po	0.519	0.442	0.581	0.518	0.444	0.577	0.536	0.460	0.597
		P1	0.203	0.188	0.216	0.203	0.188	0.214	0.238	0.205	0.264
		P2	0.105	0.100	0.109	0.105	0.101	0.108	0.145	0.117	0.167
2011	INDIVIDUAL LEVEL	Po	0.459	0.383	0.544	0.460	0.385	0.544	0.472	0.389	0.564
		P1	0.179	0.160	0.200	0.180	0.160	0.203	0.206	0.166	0.251
		P2	0.093	0.085	0.102	0.094	0.085	0.103	0.122	0.091	0.158
	HOUSEHOLD LEVEL	Po	0.355	0.289	0.451	0.355	0.290	0.491	0.366	0.296	0.468
		P1	0.127	0.111	0.151	0.128	0.111	0.152	0.146	0.119	0.187
		P2	0.063	0.057	0.072	0.063	0.057	0.072	0.082	0.064	0.110
	CHILD LEVEL	Po	0.518	0.442	0.579	0.518	0.441	0.579	0.529	0.448	0.579
		P1	0.201	0.187	0.212	0.202	0.187	0.214	0.228	0.191	0.214
		P2	0.104	0.100	0.108	0.104	0.100	0.108	0.135	0.103	0.108

The economic crisis appears to have a similar effect in terms of who crosses the poverty line in urban and rural areas, as the rise in Po is quite similar in magnitude. However, the crisis already affects poor children in rural areas much more: P2 rises by 55% in urban areas in 2009 and by 136% in rural areas under the severe scenario, and under the moderate scenario all poverty measures improve somewhat in urban areas, while P2 deteriorates by 31% in rural areas. Even the price effects, which tend to moderate the difference at lower incomes, cannot overcome the greater impact of labour market events in rural areas. There clearly needs to be longer run positive impact for a return to economic growth.

The greater impact of the crisis at lower income levels and in rural areas may at first glance seem to be counter-intuitive. Further investigation shows that though much of the income loss occurs in urban areas and even among skilled workers, these people are better protected against job losses by the fact that they often form part of households that have a variety of other income sources, e.g. additional earners and non-earnings income. Apart from social grants, which have a similar effect of diversifying income among the poor, the poor and rural dwellers are in many cases quite weakly protected against job loss. It is thus not surprising that they are pushed below, or further below, the poverty line when losing their jobs.

It is possible that the job-queue method employed to allocate job losses (i.e. using a probit model to determine who is most likely to lose their jobs) may somewhat overestimate rural rather than urban job losses amongst the lower-skilled categories of workers. On the other hand, the modelling does not take into account that through reduced remittances of earnings to rural areas, urban job losses may have negative rural impacts. Also, to the extent that some who lose their jobs in urban areas may return to their rural areas of origin (often to share in extended household resources such as grant income), the rural impact may be underestimated.

### 3.3.5 Price effects versus labour market effects

Distinguishing the part of the effect caused by price changes and job losses shows that the impact of job losses is by far the greater. Nevertheless, price changes do have an independent role and in some situations serve to moderate the impact of poverty on rural areas compared to urban areas. This particularly applies close to the poverty line.<sup>18</sup>

## 3.4 Conclusion on money-metric poverty impact

What does all of this mean for the situation of children? On the one hand, it is quite clear that the extent of the impact on child poverty depends very much on the economic scenario that one assumes. The moderate crisis scenario, which allows for a quick return to economic growth, has far less severe impacts on child poverty and indeed on poverty in the whole society. On the other hand, in the severe crisis scenario where the crisis is both deeper and more sustained, there is quite a strong impact on child poverty, but most of this impact occurs at very low levels of income, i.e. amongst the very poorest children.

It is worth again returning to the impact of the Child Support Grant on poverty. As has been indicated in previous sections, this grant severely reduces child poverty both because of its good targeting and because children are often more concentrated in poorer households. One can see from the cumulative density functions that the impact of not having the Child Support Grant is as large as that of the severe crisis. Without the Child Support Grant, the child poverty headcount ratio would have been 59.6% in 2007 rather than the 52.6% it was recorded

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18. This may not necessarily seem such an appropriate way of modelling the results, and one may wish to revert to a scenario in which only the impact of the labour market is measured. Nevertheless, within this model, poverty lines have been set for each cluster of observations in the initial sample, based on the price ratios which appear to apply in those clusters, in accordance with the methodology used. This methodology is described in Appendix B and Appendix C.

at.<sup>19</sup> This implies a 13.3% increase in the headcount ratio, a 58% increase in the poverty gap ratio and a 107% increase in the poverty severity ratio: clearly, the Child Support Grant is most effective for those deepest in poverty.

In contrast to this, the severe crisis would have increased the poverty headcount to 54.5% in 2009. This is still a much better situation than would have occurred if there had been no Child Support Grant, even in the absence of an economic crisis. Thus the impact of the Child Support Grant outweighs that of the economic crisis, and the Child Support Grant may even have reduced the impact of the crisis by keeping people out of poverty due to the grants, even if their other incomes alone would have placed them in poverty. This is effectively how one would expect people to respond in an economic crisis, namely to try to diversify income thus reducing vulnerability. Though it does not result from individual effort but from state policy, such income diversification for the poor through the grants has a very positive effect on their ability to deal with crises of this nature. So, for instance, without the grants, the level of child poverty would have risen to 63.9% compared to its initial level of 52.6% with the grants and 59.6% without the grants. Whereas the poverty headcount ratio would have increased by 7.2% compared to its initial level in 2007 if there had been no grants, it actually increased by only 3.6% in the presence of grants. Given the much higher initial levels of P1 and P2 in the absence of the Child Support Grant, the percentage impact of the crisis would have been less on these ratios without the Child Support Grant.

Naturally, other grants also have a positive effect on poverty. This can be illustrated by the following: whereas the child headcount ratio would have been about 14% higher without the Child Support Grants in 2007, it would have been yet another 11% higher in the absence of all other grants. Similarly, for P2 the value would have been about 55% higher without the Child Support Grants, whilst the loss of other grants would have increased it by another 39%. Thus the magnitude of the impact of other grants on child poverty is only a little smaller than that of the Child Support Grants within our micro-model, though it was not quite as well directed at the poorest children. However, what is of particular interest to this study is that the Child Support Grant was the grant that had expended most and therefore had the most recent major impact on reducing child poverty and that it was aimed precisely at reducing child poverty, despite the fact that different grants generally have quite similar impacts once they enter the household. (In the micro-modelling all members of a household were assumed to share the same level of welfare, determined by aggregate income, household composition (size, gender and age) and the price levels they face.)

### **3.5 Impact on non-money metric poverty**

The analysis of this document and of the study that underlies it has been focused largely on money-metric poverty. Lack of money due to the economic crisis may also spill over into other spheres of life, however, with potential consequences also for other dimensions of child poverty. Three potential areas stand out: education, health and welfare services.

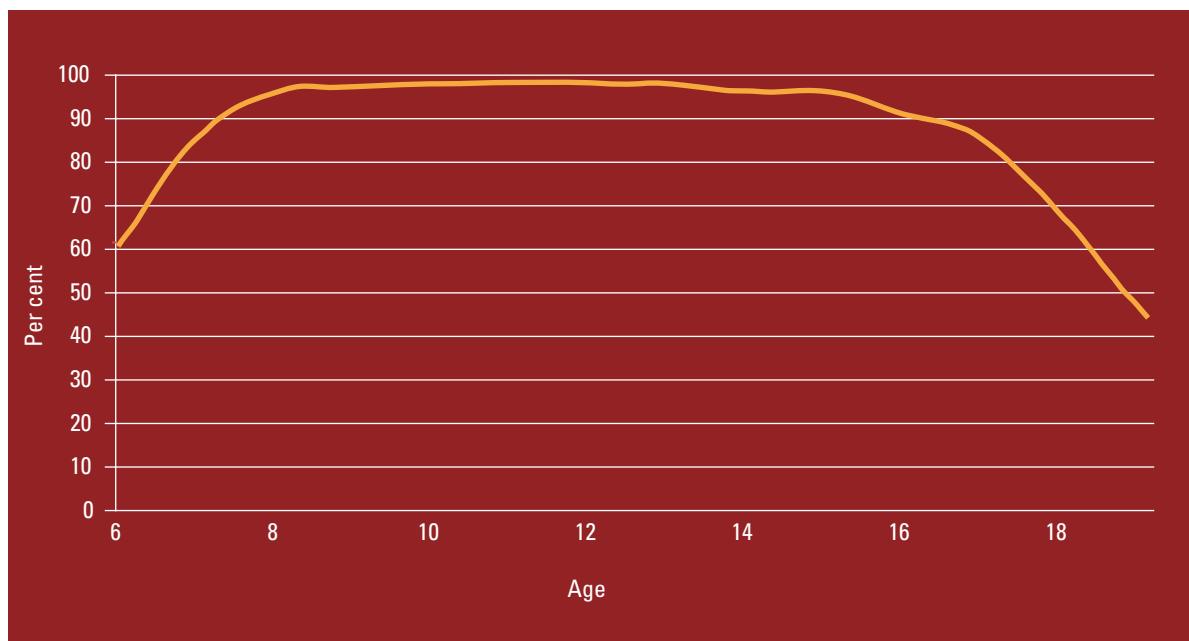
In South Africa, access to education up to secondary school level is now close to universal. The poor do not suffer exclusion from schools, but rather they are very often not able to obtain good education because of the abysmal quality of much of the education offered in South African schools. Figure 14 below shows that almost all children between the ages 7 and 17 are enrolled at schools, though quality dimension of education (as evidenced for instance in international tests) indicates that equity in this dimension is still greatly lacking. But given such universal access to schools, as well as government policies to support access for the poor (e.g. the recent decision to introduce school-fee education for children in first the poorest two

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19. This, of course, does not take into account possible effects of the changes in behaviour, such as work seeking, that may have resulted from the CSG, or the changes in family composition with regard to the location of both the child and the care-giver that may have resulted under a different scenario. It simply looks at the effect of subtracting the CSG from existing incomes.

quintiles and not the poorest three quintiles of schools), it is unlikely that the economic crisis and the increased money-metric poverty it has brought would have significantly affected school enrolment. However, it is conceivable that there may have been negative implications for school attendance. It is known that low school attendance rather than school enrolment was already a much more pervasive problem in many schools even before the crisis. School-related costs (uniforms, some books, and in some cases school fees and fees for excursions) make it more difficult and sometime embarrassing for some of the poor to attend school. School feeding programmes, where these exist in practice, may dampen such an effect. A dampening effect may also have been caused by the fact that few South African school-age children have realistic options of successfully participating in the labour market or being engaged in subsistence agriculture due to the small size of this sector.

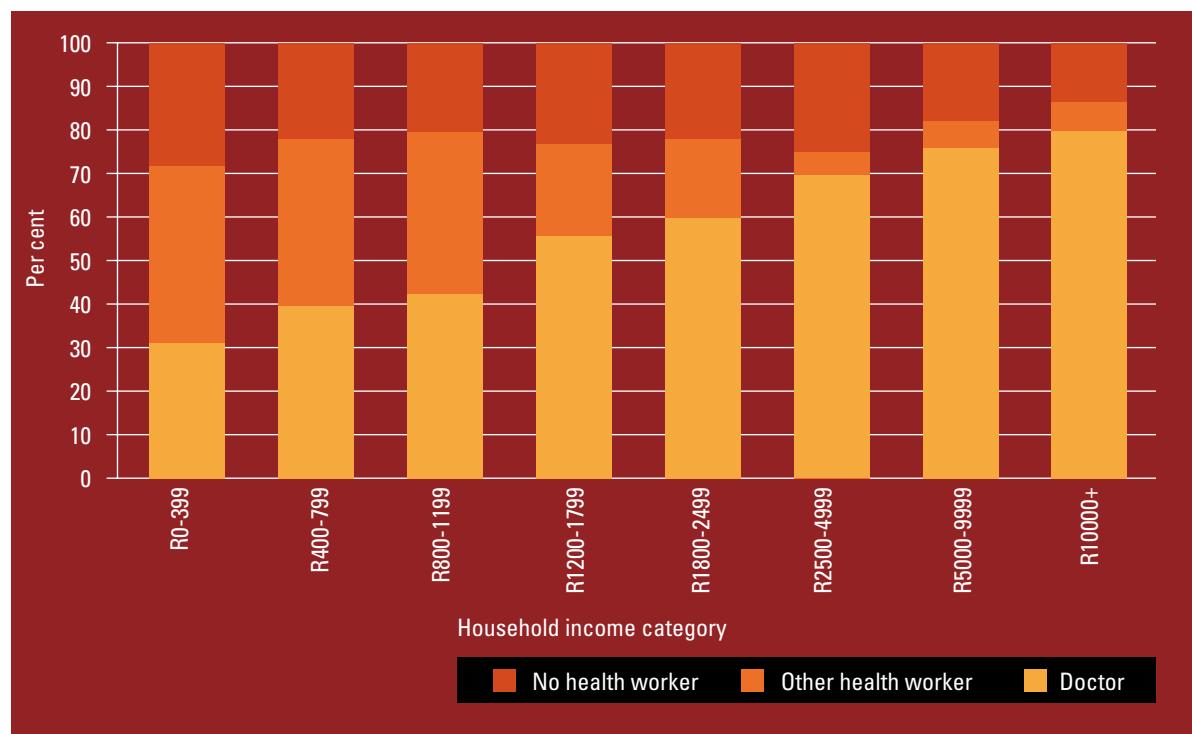
Figure 14: School enrolment ratio by age for children aged 6 to 19, 2008



Source: Calculated from GHS 2008

Health access has considerably improved since the political transition, although public health services also suffer from severe quality problems. To a large extent, the issue is no longer access to health care of some sort but rather access to quality health care which most people, even the poor, seek through visiting private health facilities when their ailment is serious enough, or when they have the financial resources to do so. Figure 15 shows that there is little evidence of getting access to a health worker when ill, and the differences between those in poorer income categories and those in richer ones are not significant. The issue is rather access to quality health services which are often identified with having access to a doctor, mainly private doctors visited at their consulting rooms. It is quite evident from the figure that such access is highly dependent on economic status. So in the case of health, like for education, the poor do not suffer lack of access to health facilities because of their poverty for most public health services are free or heavily subsidised. The financial aspect only enters into it when it comes to the choice of health facility or health worker, and it is likely that the crisis may have forced some poor children back to visiting public rather than private health facilities.

**Figure 15: Health visits to doctors and other health workers by children who were ill, 2008**



Source: Calculated from GHS 2008

Social welfare services in South Africa are quite inadequate and mainly urban based as they depend to a large extent on private welfare organisations; some are partly subsidised by the state. It is well known that child abuse is fairly common, particularly in some of the poorest communities. However, this phenomenon is not directly linked to money-metric poverty, though one can expect economic stress levels to contribute in circumstances where such a problem is already common. Thus it is quite possible that this may have risen as a result of the economic crisis.

## Overall assessment and conclusion

Child poverty is high and has long been a source of concern in South Africa thus the progress made in the past decade to reduce it, largely through expanding the Child Grant System, was very important. Some of this progress may have been reversed by the economic crisis thus its impacts needed to be studied and policy responses considered. From the combination of macro- and micro-modelling in this study, it is apparent that the impact of the economic crisis did not completely reverse the positive impact of the grants. Yet it is evident that the economic crisis did indeed have an impact on monetary poverty in South Africa. The moderate scenario shows a not very great impact, but an impact nevertheless, with the largest part of its impact being felt by those who are the poorest. In the case of the severe scenario, the impact is much greater and again it affects by far the very poor. The impact of the Child Support Grant is to moderate the poverty effects of the economic crisis, both by reducing poverty levels before the impact of the grants themselves, and by also diminishing the effect of the crisis itself on child poverty.

An overwhelming conclusion from this study is that the choice of poverty line and poverty measure matters. Many of the impacts of the global crisis are not evident around the poverty line when this is drawn at too high a level: in terms of the headcount poverty ratio, few households crossed into poverty. It was far more often the case that those affected were already below such a relatively high poverty line, that the change in their economic welfare would not be observed if the focus was only on the headcount ratio and a high poverty line. More poverty sensitive measures such as  $P_1$  (the poverty gap ratio) and  $P_2$  (the poverty severity or squared poverty gap ratio) showed bigger changes in poverty, as did the headcount ratio when the poverty line was drawn at a lower and more appropriate level. Setting the poverty line too high and using the headcount ratio as the major poverty measure may thus have the effect of leaving much of the changes in poverty unobserved when these take place largely amongst the poorest.

In the estimates of the impact of poverty, no provision has been made for an expansion of the Child Support Grant. The assumption was simply that in the time frame available, very few people would be in a position to access the grant, given also the slow reaction time on the side of the administrative machine dealing with child support grants. Also, it is indeed the situation that in most cases those already at or near the poverty line do have access to the grants and therefore the increase

in poverty would not necessarily enable more people to qualify to get the grant (fewer than one-quarter of poor children do not currently get the grant, and that is largely because of administrative delays). One instrument available to government to ameliorate the impact of the crisis is to expand the value of the grant thereby getting more money into poor households. However, currently the number of grant recipients itself is expanding rapidly as a result of changes in the age restrictions applying to the Child Support Grant as well as to the Old Age Pension, plus the further expansion of Disability Grants under the impact of HIV/Aids and other factors. This makes a further expansion of social grants unlikely to be fiscally viable. Nevertheless, having Child Support Grants has reduced poverty and vulnerability of children in the South African situation, and it can serve as an example to other developing countries in that it reduces the depth and severity of poverty and also makes the poor less vulnerable to the effect of an economic crisis by diversifying their sources of income during such crises.

How likely are the two scenarios discussed in this report? One should first consider that the macro-model specifically attempted to isolate the effects of the global financial crisis separate from for instance to earlier but enduring effects, that of a fuel and food crisis that occurred at international level. Thus actual outcomes may be worse. It appears, from present knowledge, as if the moderate scenario may better reflect the course of the international economy than the severe scenario, but that depends on future recovery which is still in its early stages. Also, the macro-model works at an annual basis and does not allow for lags within a year; in this respect, the exact location of the deepest trough may not fully reflect reality. Further, it appears as if the economic impact of the crisis has been less than under the severe scenario, yet the employment effects appear considerably worse than the moderate scenario. This may be the result of even greater wage rigidities (increasing wages during an economic crisis) than allowed for in the macro-model.

The time period over which this report has examined the crisis did not really allow for a policy response in terms of anti-poverty policy. In fact, such responses are always slow to implement and depend largely on existing institutions. The Child Support Grant in South Africa is a major instrument to this end, as it is already in place and protects the vulnerable both before the crisis and during it. Moreover, in principle it is possible to use it to expand transfers to households, though the constellation of fiscal forces in South Africa (the fact that grants are already being expounded very rapidly) and the relatively short duration of this crisis reduce its potential role during this crisis.

It needs to be emphasised that this study did not consider household and individual responses to poverty which may have unknown impacts on actual poverty outcomes particularly for children, who are the most vulnerable in the sense that they cannot act to protect themselves from the impact. Intra-household behaviour, for instance the extent to which households allocate their resources to protect children from the worst effects of the crisis, is of particular importance. But household formation, dissolution and fracturing can all occur in response to changing economic situations. To some extent, the Child Support Grant has a mitigating effect on the possible impact of such behaviour on children as it makes it more attractive to have them as part of the household.

Finally, the short section on non-money metric poverty also illustrates that South Africa is better protected than many other countries against the impact of an economic crisis in terms of how this is likely to affect children. Access to public social services is not highly dependent on income but has rather been made easy for the poor. It is the quality of such services that needs more attention for the sake of the children. In addition, the system of welfare services (as opposed to grants) is clearly inadequate and an economic crisis is likely to worsen this situation, though measurement is not easy.

The impact that has been looked at here relates to child poverty in money metric terms. However, it is also important to consider other impacts. Given the policy constellation in

South Africa, it is likely that many of the impacts of the crisis on child poverty have not been as severe as may have been the case otherwise, because of the fact that policy is already quite geared towards protecting the poor. So, for instance, the policy of not imposing school fees in the poorest two or three quintiles of schools has the effect of not making parents and children very sensitive to poverty in terms of school attendance. In fact, school attendance up to the age of 15 in South Africa is well above 90% and unlikely to be much effected by the impact of the economic crisis. Of course, it may be useful here to make a distinction between school enrolment and school attendance as the latter may be more effected than the former by the impact of the economic situation.

Similarly, the policy of largely free provision of public health services means that the crisis would not have had a great impact on people's ability to access public health services. However, it is well known that those who can afford to do so, prefer to avoid the public health services and rather use private health services because of real and perceived differences in the quality of health care provided for such services: this perception is also supported by data. The economic crisis may thus have had the effect of making it less possible for people to afford private health services, and thereby increasing numbers may revert to public health services and thus a poorer quality of service.

Child abuse is another area which is very difficult to quantify. The situation may in some cases be exacerbated by the stress caused by poor economic circumstances and in particular by a sudden deterioration in circumstances in some households. Child abuse is rife in South Africa and it is likely that the impact of the economic crisis would have increased such abuse. Present policy is unable to cope with the magnitude and nature of such a social problem in our society and the crisis only again exemplifies the difficulties faced in this field. Obviously policy and analysis in this arena would therefore have to be looked at again, not only because of the crisis, but because this is one of the areas in which South Africa does badly at dealing with the situation of those who are vulnerable in our society.

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## **Appendix A: Macro-analysis methodology**

### **Data for constructing the BAU**

The Social Accounting Matrix (SAM) described below is based on 2005 data. In order to generate the BAU, we use consensus growth forecasts by economists of around 4.5% GDP growth for 2005 and the following years. In technical terms, we will generate a BAU that fits with 4.5% GDP growth, allowing the total factor productivity parameters to adjust. Because the model is recursive dynamic, it will be solved over a ten year time horizon. Other data requirements related to gross domestic product, population and labour force growth and capital stock.

### **The SAM**

The SAM is based on the 2005 supply and use tables obtained from Statistics South Africa and other national data sets from various sources such as the Reserve Bank. This SAM has 54 activities and 54 commodities; two broad factors, labour and capital; four institutional sector accounts (households, enterprises, government and the rest of world); and two saving and investment accounts (change in inventories and gross domestic fixed investment [GDFI]).

For the trade parameters, we use Gibson (2003) for the low-bound export supply, while demand elasticities are obtained from Behar and Edwards (2004). Estimates for parameters in industries' production and household demand are not available for South Africa. Therefore, this study borrows these values from the literature surveyed by Annabi et al. (2006). Finally, unemployment rates are drawn from the labour force survey report by Statistics SA (2005).

Given this specific study, Table A1 presents trade relations between South Africa and the rest of the world in 2005. It specifies the import penetration rate as well as the sectoral share of imports in total imports. Moreover, it details the sectoral export intensity rates measured as a share of exports in production in each sector and the share of each sector exports in total exports.

Table A1: Structure of South African trade (%)<sup>20</sup>

SECTORS	EXPORTS INTENSITY RATES AS A SHARE OF TOTAL SECTORAL PRODUCTION (%)	SECTORAL EXPORT SHARES AS A PORTION OF TOTAL EXPORTS (%)	IMPORT PENETRATION RATES AS A SHARE OF TOTAL SECTORAL SUPPLY (%)	SECTORAL IMPORT SHARES AS A PORTION OF TOTAL IMPORTS (%)
AGRICULTURE, FORESTRY & FISHING	21.89	4.14	5.84	1.09
COAL MINING	48.96	5.01	4.47	0.26
GOLD & URANIUM ORE MINING	98.65	6.58	0.53	0.00
OTHER MINING	50.65	12.82	30.55	11.08
FOOD	8.50	2.38	6.02	2.52
BEVERAGES & TOBACCO	22.16	2.29	2.54	0.42
TEXTILES	16.58	0.70	14.40	1.15
WEARING APPAREL	12.89	0.54	11.41	1.27
LEATHER & LEATHER PRODUCTS	35.87	0.44	17.45	0.26
FOOTWEAR	5.12	0.05	20.39	0.72
WOOD & WOOD PRODUCTS	12.94	0.61	8.98	0.50
PAPER & PAPER PRODUCTS	15.95	1.45	8.81	0.96
PRINTING, PUBLISHING & RECORDED MEDIA	4.89	0.22	14.78	1.10
COKE & REFINED PETROLEUM PRODUCTS	17.39	2.59	5.34	1.30
BASIC CHEMICALS	30.81	4.60	21.66	4.32
OTHER CHEMICALS & MAN-MADE FIBRES	11.54	2.09	12.53	3.95
RUBBER PRODUCTS	23.54	0.48	22.56	0.91
PLASTIC PRODUCTS	5.54	0.36	9.13	0.73
GLASS & GLASS PRODUCTS	11.56	0.19	12.64	0.29
NON-METALLIC MINERALS	7.71	0.46	11.18	0.87
BASIC IRON & STEEL	62.48	10.48	11.56	1.24
BASIC NON-FERROUS METALS	47.03	2.94	19.44	1.10
METAL PRODUCTS EXCLUDING MACHINERY	19.02	1.79	13.88	1.66
MACHINERY & EQUIPMENT	67.47	7.11	35.35	12.83
ELECTRICAL MACHINERY	13.23	0.97	17.18	2.25
TELEVISION, RADIO & COMMUNICATION EQUIPMENT	53.25	0.88	39.74	5.26
PROFESSIONAL & SCIENTIFIC EQUIPMENT	84.86	0.90	30.42	2.40
MOTOR VEHICLES, PARTS & ACCESSORIES	20.46	6.72	23.08	15.32
OTHER TRANSPORT EQUIPMENT	27.40	0.68	33.73	3.24
FURNITURE	48.87	1.71	9.48	0.56
OTHER INDUSTRIES	18.34	1.94	12.97	3.01
ELECTRICITY, GAS & STEAM	0.96	0.11	0.02	0.00
WATER SUPPLY	0.00	0.00	0.00	0.00
BUILDING CONSTRUCTION	0.05	0.02	0.26	0.09
WHOLESALE & RETAIL TRADE	1.21	1.01	0.06	0.05
CATERING & ACCOMMODATION SERVICES	21.33	1.45	22.81	2.49
RAILWAY TRANSPORT	15.39	0.58	9.16	0.35
ROAD TRANSPORT	7.42	1.93	1.55	0.37
TRANSPORT VIA PIPELINE	16.04	0.04	0.00	0.00
WATER TRANSPORT	13.52	0.53	31.67	2.80
AIR TRANSPORT	20.37	0.65	32.11	2.18
TRANSPORT SUPPORT SERVICES	9.87	0.80	12.74	1.21
COMMUNICATION	7.01	2.21	6.13	2.00
FINANCE & INSURANCE	6.26	0.61	9.71	1.40
BUSINESS SERVICES	3.90	4.61	1.70	1.97
MEDICAL, DENTAL & OTHER HEALTH, & VETERINARY SERVICES	0.60	0.11	1.01	0.20
COMMUNITY, SOCIAL & PERSONAL SERVICES	3.69	1.22	6.47	2.29

Source: Own computations from SAM (2005)

20. This table only refers to tradable sectors, thus government's activities are not represented.

From the table it is clear that gold (98% of its production), scientific equipment (84%), and machinery and equipment (67%) heavily rely on exports. A decrease in world demand or in international prices for these commodities will thus have a huge effect. In the same way, some sectors depend on imports such as radio and equipment (39%), or other mining (30%). A decrease in international prices will strongly benefit these sectors, stimulating imports and increasing competition from foreign suppliers on domestic market. South Africa exports most of its mineral and precious metals, together representing 40.9% of total exports. An external shock on mineral prices would thus have strong effects on the economy.

## Building the BAU

In 2005, the year of the SAM, South Africa had anticipated long run GDP growth rates of 4.5% per year. We therefore simulate a BAU taking into account the expected rate of GDP growth. In order to reach this GDP, we add a total factor productivity parameter. Moreover, we had for 2005 investment by destination for all the sectors, as well as depreciation rates by activities. Statistics South Africa estimated that the population will grow at a rate around 1%. Calibrating the BAU on these “real” data, we found that capital grows faster than labour, so in the BAU we have a decrease in unemployment. Moreover, as our production factors become more and more efficient, prices decrease (in real terms) also in the BAU. These pieces of information are important in order to understand the results.

## The modelling framework

To evaluate the impacts of the world economic crisis on South Africa, we use the dynamic Poverty and Economic Policy (PEP 1-t) standard model by Decaluwé et al (2009). However, we have changed several assumptions of this standard model in order to better take into account the South African economy. Our model has two production factors, capital and labour, but the latter is disaggregated into four types of labour: informal workers, unskilled, semi-skilled and highly skilled workers. Each activity uses both production factors.

In line with the SAM, the model has 54 activities and commodities. The production function technology is assumed to be of constant returns to scale and is presented in a four-level production process. At the first level, output is a Leontief input-output of value added and intermediate consumption. At the second level, a Constant Elasticity of Substitution (CES) function is used to represent the substitution between composite labour and capital. At the third level, composite labour demand is also a CES function between composite-skilled and composite unskilled labour. Note that the composite skilled demand is a CES with a low elasticity between skilled and semi-skilled workers, capturing the fact that it is quite difficult for the firms to substitute semi-skilled for skilled workers. On the other hand, we also use a CES to describe the composite unskilled labour demand between informal and unskilled workers. Here, we assume that for the producer it is relatively easy to substitute them. Figure 8 in the main text gives the value added structure.

South Africa is faced with high unemployment problems, notably for semi-skilled and unskilled labour. Moreover, unions are very strong in the country. South Africa has the largest trade union movement in Africa, a movement that has been influential in policies on the labour market and other related industrial policies. They negotiate salaries and wages, conditions of service, workforce restructuring and retrenchments on behalf of their members. As a result, wages and salaries are strongly rigid downwards. To take this rigidity into account in our modelling, we assume that wages cannot decline. Thus, if production decreases, producers will not be able to decrease their employees’ wages below the initial level. On the other hand, this rigidity will have an impact on unemployment: given that producers cannot decrease workers wage rate, they will have to retrench some of them.

The nominal exchange rate is the numeraire in the model.<sup>21</sup> Following the assumption that South Africa is a small country, world prices are fixed. However, we assume that South African exporters face a less than infinite foreign demand equation for exports. In order to increase their market share on the world market they need to reduce their FOB prices for exports increasing their competitiveness with respect to other suppliers on the international market. Factor supplies are fixed in the first period and then grow at the population rate for labour force and using an accumulation equation for capital.<sup>22</sup> Transfers between institutions as well as government consumption in volume are fixed at the base year and then grow at the population rate. We assume that the rest of the world's savings is a fixed proportion of GDP. Given this assumption, we do not allow South Africa to borrow further from the rest of the world.<sup>23</sup>

### Simulation scenarios

As the dynamic CGE model does not take into account financial flows, it cannot directly capture the financial consequences of the world economic crisis on the South African economy. However, the economic consequences of the slowdown of the world economy will be captured through the real side of the CGE model. The main transmission channels of the world crisis to developing countries are a decrease in export demand and export prices, a decrease of FDI (Foreign Direct Investment) and a tightening of the capacity to finance a current account deficit, a decrease in remittances and a drop in tourism revenues. However, for South Africa the latter two channels are not relevant: South Africa does not receive substantial household-to-household remittances from abroad and tourism has not decreased.<sup>24</sup> Thus we will focus on the external trade and foreign financing of domestic firms. On the positive side, a drop in international prices could lead to a reduction in import prices and a possible reduction in the cost of imported goods especially for imported intermediate and capital goods. This positive impact could be counteracted by increased competition by foreign suppliers in sectors competing with imports.

An innovation of our study is that we split the economy into four different groups of activities. Each group is defined by its degree of dependency/exposure to the global crisis and is assumed to be affected differently by the crisis. The four groups are defined as follows (see Table A2).

- *Unaffected sectors (Group 1):* It is assumed that these sectors will face neither a reduction in foreign demand nor a reduction in international prices. Basically, Group 1 consists of gold,<sup>25</sup> food and beverage commodities.
- *Weakly affected sectors (Group 2):* These sectors are not heavily dependent on foreign trade and not very closely related to other sectors. Found here are commodities such as agriculture, clothing and wood.
- *Mildly affected sectors (Group 3):* As for the previous group, these sectors are not heavily dependent on foreign trade but are closely linked to other sectors. Such sectors will react to a reduction in consumption, investment expenditures or reduction in demand for intermediate goods. This group refers to most of transports products, trade and construction.
- *Strongly affected sectors (Group 4):* These sectors are closely linked to the international markets either on the export dimension or the import side. Here we find fossil fuel, other mining, machinery and equipment.

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21. Note that in the CGE results, a real devaluation of the Rand takes the form of a generalised reduction in domestic prices.

22. To specify the accumulation of capital, we follow Jung and Thorbecke (2001) function.

23. This assumption may seem strange, given that the country has in the past increased its savings from abroad. However, South Africa does not want to increase its current level of borrowing substantially.

24. One factor in the steady performance of tourism in 2009 was that many sports events were organised in South Africa (the Confederation Cup, Lion's Tour, preliminary organisation for the World Cup).

25. This paper does not consider the speculative surge in the demand for gold. This scenario will be analysed in future work.

**Table A2: Sectors grouped according to severity of the impact of the crisis**

GROUP	SECTORS	NUMBER OF SECTORS
<b>GROUP 1: NON-AFFECTED SECTORS</b>	Gold & uranium ore mining Food Beverages & tobacco	3
<b>GROUP 2: SECTORS WEAKLY AFFECTED</b>	Agriculture, forestry & fishing Textiles Wearing apparel Leather & leather products Footwear Wood & wood products Paper & paper products Water supply Furniture	9
<b>GROUP 3: SECTORS MILDLY AFFECTED</b>	Building construction Electricity, gas & steam Basic non-ferrous metals Metal products excluding machinery Other industries Basic chemicals Printing, publishing & recorded media Other chemicals & man-made fibres Rubber products Plastic products Glass & glass products Non-metallic minerals Wholesale & retail trade Catering & accommodation services Railway transport Road transport Transport via pipeline Water transport Air transport Transport support services Communication Finance & insurance Business services Medical, dental & other health & veterinary services Community, social & personal services	31
<b>GROUP 4: SECTORS STRONGLY AFFECTED</b>	Coal mining Other mining Coke & refined petroleum products Basic iron & steel Machinery & equipment Electrical machinery Professional & scientific equipment Other transport equipment Television, radio & communication equipment Motor vehicles, parts & accessories	10

Table A3 gives an overview of the South African economy for the different categories described above. We report the shares of output, of exports and imports, as well as the composition of local demand and labour market. Thus, we can point out that mildly affected sectors represent around 60% of total output while strongly and mildly affected sectors represent respectively 48.2% and 31.8% of total exports. These two groups together represent 80% of total exports.

**Table A3: Initial shares in 2005 (% in value)**

COMMODITIES/ SECTORS	TOTAL OUTPUT	EXPORTS	IMPORTS	LOCAL DEMAND	LABOUR DEMAND
NON-AFFECTED	6.2	11.0	4.1	5.1	4.7
WEAKLY AFFECTED	6.2	9.0	8.7	5.7	4.4
MILDLY AFFECTED	59.5	31.8	32.4	65.2	55.7
STRONGLY AFFECTED	17.0	48.2	54.8	11.5	9.0
ALL TRADEABLE	88.9	100.0	100.0	87.5	73.7
TOTAL	100.0	100.0	100.0	100.0	100.0

Note that the non-tradable sector<sup>26</sup> is not taken into account and as a result the sum of shares does not add to 100% (except, of course, in the case of imports and exports). The non-tradable sector represents more than 25% of the total wage bill and consequently provides employment opportunities to a significant part of the population.

The paper simulates the impact of two scenarios that are distinguished by the magnitude of the recession (severe or moderate) as discussed in the main text. We base our choices of the scenario magnitude on data for South Africa. A visible effect of the crisis has been declines in several commodity prices since their peaks around July 2008. Most dramatic of all have been the decline, of around 60%, in the prices of platinum group metals (PGMs) as shown in the Table A4.

**Table A4: Commodity prices per oz/per bbl**

	2007		2008 (YTD)		CURRENT (MAY 2009)	
	\$ PRICE	RAND PRICE	\$ PRICE	RAND PRICE	\$ PRICE	RAND PRICE
GOLD	697	4900	895	6918	916	8519
PLATINUM	1304	9167	1772	13698	998	9281
PALLADIUM	353	2482	393	3038	196	1823
RHODIUM	6113	42974	7550	58362	3250	30225
OIL	72.7	511	111.2	860	78.3	728

Source: Econometrix (2008)

Table A5 illustrates the magnitude of the decline in exports of precious metals and the decline in the value of oil imports on an annualised basis. It can be seen that there has been a decline in exports of precious metals of some R13.0bn compared with 2007 and by R37.4bn compared with the average export revenue achieved in the year to date in 2008.

**Table A5: Value of annualised mineral imports/exports (R'bn)**

EXPORTS/IMPORTS	2007	ANNUALISED 2008 (YTD)	ANNUALISED CURRENT
GOLD	39.9	46.9	48
PLATINUM	46.2	58.6	39.7
PALLADIUM	6.9	7.2	4.3
RHODIUM	26.9	34.6	17.9
PGMs	83	100.4	61.9
OIL	109.8	153	129.5

Source: Econometrix (2008)

26. This sector regroups government sectors and water.

**Table A6: Change in annualised mineral/exports (R'bn)**

	CURRENT VERSUS 2007 AVERAGE	CURRENT VERSUS 2008 AVERAGE
<b>EXPORTS</b>		
GOLD	+8.1	+1.1
PLATINUM	-6.5	-18.9
PALLADIUM	-2.6	-2.9
RHODIUM	-12	-16.7
PGMs	-21.1	-38.5
OIL	-13	-37.4
<b>IMPORTS</b>		
OIL	-19.7	-23.5
BALANCE	+6.7	-13.9

Source: Econometricx (2008)

One needs to also take into account declines in export values of minerals other than precious metals. In particular, coal prices have declined by some 30% in recent months, not to mention the 50% decline in the price of copper from its peak in July. One could therefore be looking at a further R10bn decline in the value of mineral exports in relation to the average for this year as a whole. The net effect at present of lower commodity prices would be to contribute to the widening of South Africa's trade deficit by around R15bn to R25bn on an annualised basis compared with the situation which prevailed when commodity prices were at their peaks in July 2008. This is not a dramatic deterioration in the trade account and is relatively small in relation to the services account of the current account of the balance of payments.

South Africa has a current account of the balance of payments deficit (exports minus imports) equal to between 7.5% and 9% of GDP. The country does not have substantial foreign exchange reserves to finance that deficit and therefore relies on capital inflows. But if these turn to outflows as a result of the financial crisis, the Rand will be under enormous pressure and will lose value rapidly in world markets. This will mean that the world financial crisis will likely impact more heavily on South Africa in terms of its wide economic effects than it will via the exposure of its financial markets to the melting fortunes of foreign financial firms.

Thus, in terms of the impact of the crisis on foreign financing of domestic firms, we assume that foreign transfers to firms decrease by 5% in 2008–2009 and then increase by 2.1% in 2010 in the moderate scenario. In the severe scenario, we assume that foreign transfers decrease by 10% in 2008–2009 and then increase by 1% in 2010. This reduction corresponds globally speaking to a tightening of the liquidity available to firms to finance their investment programmes and has an indirect impact on the current account. A reduction in foreign transfers reduces the financial resources available to finance imports and will require an increase in exports to compensate for this reduction.

After 2010, world prices recover to their BAU values; world demand increases at the population growth rate.

## **Appendix B: Micro-analysis methodology**

In order to estimate the impact of the global crisis on monetary poverty given the particular focus on child poverty, we need to capture the changes in household and individual consumption in response to changes in commodity prices and household income (Bibi, Cockburn, Coulibaly & Tiberti, 2009: 1). Models of household consumption behaviour provide estimates of price and income elasticities that are used to compute pre-crisis real individual consumption. The methodological approach adopted by this study on the micro-side draws largely from the work of Cockburn, Fofana and Tiberti (forthcoming UNICEF and PEP working paper), Bibi, Cockburn, Fofana and Tiberti (forthcoming UNICEF and PEP working paper), and Bibi, Cockburn, Coulibaly and Tiberti (2009), and this section will to some extent paraphrase their methodology. Given the macro-micro simulation results on changes in commodity prices, wages and labour market status, the pre-crisis real individual income can be compared with the base year (pre-crisis) equivalent to determine the impact of the crisis on poverty. A description of the data and methodology used to derive pre- and post-crisis individual income follows. Specific issues surrounding the South African data and the consequent limitations and adaptations for the micro-methodology are also discussed.

### **Data description**

#### **Income and Expenditure Survey 2005/6**

The Income and Expenditure Survey (IES) conducted by Statistics South Africa between September 2005 and August 2006 was the third of its kind. The main aim of the IES is to update the representative household basket of goods and services needed for calculating the Consumer Price Index (CPI). However, the IES datasets have also become important sources of information for welfare analysis.

The IES 2005/2006 adopted a new sample design framework consisting of approximately 3 000 primary sampling units that were based on the Census 2001 enumeration areas. Each PSU was representatively divided into four quarterly allocations of 750 each, within which a random sample of 250 PSUs was selected every month. A sample of eight households was subsequently selected from each of the sampled PSUs for fieldwork. This would ensure that the sample drawn was evenly spread over the twelve month survey period, whilst remaining nationally representative in each quarter. After exclusions, the final sample size was 21 144 households. Data collection comprised a main questionnaire that was divided and conducted on five separate visits. Households were further required to record all food expenditures relating to the survey month in a weekly diary. Therefore, four separate diaries were completed by each household. Other expenditures (mostly non-food related) for the twelve month period prior to the survey were also declared by households. A significant issue of the IES 2005/6 dataset that is highly relevant to this study regards the lack of unit price data, i.e. only total household monthly expenditure per expenditure item is reported. Price was therefore generated using the minimum monthly expenditure reported in each district as a proxy for the unit district price. This is in line with Fry et al (2000), and has been adopted by Koch (2007) in analysing South African household expenditure shares and the pitfalls of South African expenditure data.

An issue that arose from the IES 2005/2006 dataset regards the under-reporting of food expenditure, perhaps due to respondents fatigue from the arduous task of maintaining weekly expenditure diaries. This may prove problematic for the micro-analysis since the main focus is placed on food expenditure given the repercussions for child poverty in particular. A further issue is the lack of labour market information which is required for adequate modelling of wages and employment probability. Therefore, this study makes use of an alternative dataset for modelling real consumption before and after the crisis which contains both income and expenditure data, but is more detailed with regards to labour market and productive

characteristics of individuals. This dataset is discussed next. However, the IES dataset will still be used to calculate price (own and cross) and income elasticities to inform the macro-model. It will further be of interest to compare the elasticity results of the IES with the NIDS dataset.

### National Income Dynamics Survey

The micro-analysis makes use of the expenditure and income data from the first wave of the National Income Dynamics Survey (NIDS). This survey has been designed with the aim of tracking changes in the well-being of approximately 28 000 individuals from 7 305 households in South Africa. This is achieved through recording changes in *inter alia* incomes, expenditures, assets, education and access to healthcare. The first wave of data was collected over the course of 2008, while it is foreseen that data will be collected every two years. Questionnaires were administered at the household as well as the individual level (separately for adults and children). Individuals of 12 to 59 years in age were further asked to complete a numeracy test. The survey employed a stratified, two-stage cluster sample design. In the first stage, 400 primary sampling units (PSUs) were selected from Statistics South Africa's 2003 master sample of 3000 PSUs.<sup>27</sup> The explicit strata in the master sample are the 53 district councils (DCs). Two sets of weights are thus provided, the design weights and the post-stratification weights.

The expenditure section of the household questionnaire provides information on household spending on 32 food products and 53 non-food products. Non-response was widespread.<sup>28</sup> In preparing the NIDS data for public release, a number of derived variables were generated. These include the aggregation and imputation of missing values for household income and expenditures. Full descriptions of the methodologies employed for the imputation of food and non-food expenditures, income and housing expenditure are available in the NIDS technical reports (see Finn et al, 2009; Argent, 2009).

As for the IES 2005 dataset, no unit price data are provided. Price was therefore generated using the minimum monthly expenditure for an item or expenditure category reported in each district as a proxy for the unit district price. As much as is possible, district prices are generated using only response data (imputed expenditures were not used). In cases where the expenditure data for all sampled households within a particular district are imputed, the median price for the entire sample is used. Expenditure on food in NIDS is further found to be more highly aggregated than the expenditure data of the IES, which may lead to poorer proxies of price given the high degree of heterogeneity within food categories.

The main advantage to using the NIDS dataset is that the consumption behaviour of a household can be directly linked to the labour market activity and earnings potential of that household. This makes it possible to directly assess the change in real individual consumption for a specific household. NIDS provides information on the labour market status, occupation and industry of employment which combined the maximum level of education attained and makes it possible to determine the skills levels of individuals. Information on union membership and on UIF contributions and VAT registration are also provided, making it possible to determine whether the individual is employed in the formal or informal sector.

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27. This sampling frame was the same one used for the Labour Force Surveys (LFSs) and General Household Surveys (GHSs) between 2004 and 2007, and for the Income and Expenditure Survey (IES) 2005/6.

28. 22 524 cases of non-response in the non-food section and 5 695 in the food section (Finn et al, 2009).

## Modelling the post-crisis level of real adult equivalent consumption

### Adult equivalent aggregate consumption and categories of consumption items

In order to estimate the base year (pre-crisis) level of consumption and price elasticities (to be used by the macro-model), the micro-analysis needs to distinguish roughly 16 good categories (15 food groups and 1 non-food group). In the South African case, 14 food and 1 non-food categories were chosen, giving a total of 15 categories.<sup>29</sup> These categories were chosen so as to be in line with the food, non-alcoholic beverage and alcohol beverage categories defined by the Classification of Individual Consumption According to Purpose (COICOP) method (published by the United Nations Statistics Division). Each commodity distinguished in the household survey was assigned to one of the 15 categories of goods, with products being grouped into broad food categories based on the homogeneity of the different food products with regards to price, quality, nutritional/caloric content, etc. Expenditure on products purchased in the market, received as gifts or in-kind and self-consumption were aggregated to give total monthly household consumption (Bibi et al, 2009: 73), and converted to an annual basis by multiplying by 12 (unless where expenditure is already given at an annualised value).

Assuming a unitary household bargaining model, aggregate household consumption was allocated to individuals in the household by dividing total household consumption by the number of adult equivalents in the household (Bibi et al, 2009: 73). The equivalence scale adopted by the micro-analysis is the “caloric requirements” approach which calculates the adult equivalent scale of each individual in the household based on the WHO calorie requirements tables by age and sex, with adult males aged 18–30 forming the reference group (adult equivalent scale equal to 1). Equivalence scales by age and gender are presented in Table B1.

**Table B1: Equivalence scale based on daily caloric intake, by gender and age**

YOUNG CHILDREN		
<1		0.32
1–2		0.44
2–3		0.52
3–5		0.60
OLDER CHILDREN		
	Boys	Girls
5–7	0.71	0.67
7–10	0.81	0.69
10–12	0.85	0.75
12–14	0.92	0.81
14–16	1.02	0.83
16–18	1.10	0.83
ADULT		
	MEN	WOMEN
18–30	1.00	0.77
30–60	0.96	0.79
>60	0.81	0.71

Source: FAO/WHO/UNU (1985)

29. The food categories were selected as mealie meal, breads/cereals, meat, fish, vegetables, fruit/nuts, oils/fats, dairy, eggs, sugar, non-alcoholic beverages, coffee/tea, other food products not elsewhere specified, and alcohol.

## Converting individual consumption into real terms

The approach adopted by the micro-analysis for converting individual consumption into real consumption and comparing real consumption over time is the Almost Ideal Demand Systems (AIDS) approach of Deaton and Muellbauer (1980). In addition to the per adult equivalent consumption values discussed above, the share of each good category in terms of total household consumption and the district median unit price for all food categories were required for estimating the parameters of the demand system. However, no price data were available in the South African datasets. The proposed solution to this issue has already been discussed.

The following demand system model was estimated:

$$w_{j,c,h} = a_j + \sum_{k=1}^K b_{j,k} \ln p_{k,c} + c_j \ln \frac{x_{c,h}}{z_c} + e_j D_{c,h} \quad (1)$$

with

$$b_{j,k} = b_{k,j}; \sum_{j=1}^J a_j = 1; \sum_{j=1}^J b_{j,k} = \sum_{j=1}^J c_j = \sum_{j=1}^J e_j = 0 \quad (2)$$

where  $w_{j,c,h}$  is the share of aggregate consumption for household  $h$  living in cluster  $c$  that is spent on commodity  $j$ ,  $p_{k,c}$  is the price of that commodity in cluster  $c$ ,  $x_{c,h}$  is the adult equivalent total expenditure,  $z_c$  is the poverty line in  $c$ ,  $D_{c,h}$  is a vector of socio-demographic household characteristics (see Deaton & Muellbauer, 1980). As district poverty lines are not available for South Africa, the adult equivalent total expenditure is scaled relative to another consumption value, household consumption at the 40 percentile or median consumption within a district. Equation (1) could similarly be written as:

$$w_{j,c,h} = a_j + \sum_{k=1}^K b_{j,k} \ln p_{k,c} + c_j \ln y_{c,h} + e_j D_{c,h} \quad (3)$$

$$\text{with } y_{c,h} = \frac{x_{c,h}}{z_c} \quad (4)$$

where  $y_{c,h}$  is considered endogenous (Bibi et al, 2009: 76).

The AIDS model in equation (1) is estimated following Deaton (1997), and relies on the spatial variability of prices within a country in order to estimate the parameters  $b_{j,k}$ ,  $c_j$  and  $e_j$ . A three-stage least squares model was used for this purpose.<sup>30</sup>

Following the estimation of the model parameters, consumption in real terms can be calculated as:

$$\ln e_{c,h} = b(\mathbf{p}_r) \left[ \frac{\ln x_{c,h} - \ln z(\mathbf{p}_c)}{b(\mathbf{p}_c)} \right] + \ln z(\mathbf{p}_r) \quad (5)$$

where  $z(\mathbf{p})$  and  $b(\mathbf{p})$  are defined as (see Deaton and Muellbauer, 1980):

$$\ln z(p_c) = a_{0c} + \sum_{k=1}^K a_k \ln p_{c,k} + \frac{1}{2} \sum_{j=1}^J \sum_{k=1}^K b_{j,k} \ln p_{c,j} \ln p_{c,k} \quad (6)$$

$$b(p) = c_0 \prod_j p_j^{c_j} \quad (7)$$

The own and cross price elasticities can also be calculated from the demand system parameters. The own price elasticity ( $\epsilon_{j,j}$ ) for good  $j$  is defined as:

30. The model may be run separately for urban and rural areas in order to take into account the structural differences between these area types.

$$\varepsilon_{j,j} = \left( \frac{b_{j,j}}{\overline{w}_j} \right) - 1 \quad (8)$$

where  $\overline{w}_j$  identifies the mean value of good  $j$ 's share.

The cross price elasticity of demand of good  $j$  with respect to a change in the price of good  $k$  is defined as:

$$\varepsilon_{j,k} = \frac{b_{j,k}}{\overline{w}_j} \quad (9)$$

The income elasticity ( $\eta_j$ ) is calculated as:

$$\eta_j = \frac{\mu_j}{\overline{w}_j} + 1 \quad (10)$$

where  $\mu_j = c_j + 2d_j \overline{y}_{c,h}$  with  $\overline{y}_{c,h}$  identifying the mean value of the logarithm of  $y_{c,h}$

### **Modelling the linking variables in the micro-model – wages, labour market movements and commodity prices**

#### **Commodity prices**

Changes in commodity prices are estimated at the sectoral level in the CGE model. The sectors are defined such that they correspond to the 15 categories distinguished in the micro-analysis (see above).

#### **Wages**

Potential wages and probability of employment are predicted using the sample of economically active individuals, i.e. those individuals who are of working age (between 15 and 65 years) and have labour market status of either unemployed or employed. The strict/narrow definition of unemployment was used. Paid employment may either occur in the formal or informal wage sectors. In addition to employment by sector, further distinctions were made by skills level (skilled, semi-skilled and unskilled).

The wage regressions for the formal and informal sectors are defined as:

$$\ln w_i^F = \alpha + \beta_i X_i + \varepsilon_i \quad (11)$$

$$\ln w_i^{INF} = \lambda + \vartheta_i X_i + v_i \quad (12)$$

where  $\ln w_i^F$  and  $\ln w_i^{INF}$  are the logarithm of wage received by individual  $i$  working in the formal ( $F$ ) and informal ( $INF$ ) sectors respectively.  $X_i$  represents a vector of productive characteristics that include inter alia, gender, years of education (quadratic), experience<sup>31</sup> (quadratic), occupation dummies, industry dummies, union membership and geographical characteristics of the household (province).

The macro-model provides information on variations in wages for the various categories of workers. The wage functions estimated by equations 11 and 12 imply that only individuals with wage employment are considered in estimating the model. Therefore, the large incidence of unemployed individuals in the sample can lead to selectivity bias, i.e. ordinary least square estimation of wage equations will lead to biased and inconsistent estimates. It has therefore become common practice to improve the wage equation using Heckman's correction procedure for selectivity bias (Heckman, 1979). One of the techniques proposed by

31. Experience is calculated using the formula for potential experience i.e. experience = age – years of schooling – 6.

Heckman proceeds in two steps: firstly, a reduced-form probit equation of the probability of having an observed wage is estimated, which is then used to calculate the Mills ratio; secondly, the inverse of the Mills ratio, also known as “Heckman’s lambda”, is included in the OLS estimation of the wage equation as an explanatory variable. In order to solve the identification problem, the employment equation has to include some variables which only influence the probability of being employed and not the wage, once such workers are employed. These are typically household socio-demographic characteristics such as marital status, number of children in the household, and whether or not the wage earner is the household head. The selection equation may also control for educational level, experience and residence in a rural or urban area.

The wage regression model is therefore run separately for each category of worker following the Heckman selection model. The Heckman procedure allows for both the wage and employment probability equations to be jointly estimated for each of the worker categories. Following the estimation of the wage and employment models for each sector, the probability of employment in each of the sectors (worker categories) is predicted for the entire sample of economically active individuals between the ages of 15 and 65 years. Wages are similarly predicted. These will be used for reconciliation with the macro-model in the following section.

### Movement between the formal and informal labour markets

As mentioned, the macro-model provides information on variations in formal and informal sector employment.<sup>32</sup> In order to transmit this information to the micro-analysis to determine changes in real income/consumption, it must first be determined which individuals are affected. The “job-queuing” approach is adopted for this purpose. This entails ranking the sample of economically active individuals according to their predicted probability of being (first) in the formal wage sector and (secondly) in the informal wage sector. The results of the CGE model will then inform movements between these two sectors, with those individuals with the lowest probability of employment being the first to “leave” the sector, and those with the highest probability of employment being the first in line to “enter” the sector. This method assumes no change in the supply side of the labour market. The pathway of labour transition is imposed “a priori” according to a ranking of individual preferences; for example, the movement from skilled formal sector to semi-skilled formal sector.

### Income from self-employment and capital

Income from self-employment activities is defined as:

$$\pi_h = \sum_{k=1}^K Y_k p_{y,k} - I_k p_{I,k} \quad (13)$$

where  $Y_k$  is the quantity of  $k$  produced,  $p_{y,k}$  is the producer price of good  $k$ ,  $I_k$  is the quantity of inputs into the production of  $k$ , and  $p_{I,k}$  is the price of inputs for the production of  $k$ . However, given the limitations of the South African data with regards to producer prices and input prices and quantities, self-employment is unlikely to be modelled in this way. Rather, variations in earnings reported through self-employment may be informed by macro-model.

### Transfers

Transfers received by households are defined as:

$$Tr_h = Tr_{h,pu} + Tr_{h,Pr\ Ex} + Tr_{j,Pr\ In} \quad (14)$$

where  $Tr_{h,pu}$  are public transfers, and  $Tr_{h,Pr\ Ex}$  and  $Tr_{j,Pr\ In}$  are private transfers (internal and external). Changes in transfers are informed by the macro-model.

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32. Self-employment is assumed to be constant.

## Household aggregate income

Given the above changes in specific income sources, total household income at time  $t=0$  (pre-crisis period) can be written as:

$$Y_{c,h}^{t=0} = \sum_{i \in h} w_i^F F^{t=0} + \sum_{i \in h} w_i^{INF} INF^{t=0} + \pi_h^{t=0} + Tr_h^{t=0} \quad (15)$$

where  $F$  is a binary variable taking a value of **1** if person  $i$  is employed in the formal sector, and **0** otherwise. Similarly,  $INF$  is a binary variable taking a value of **1** if person  $i$  is employed in the informal sector, and **0** otherwise. The change in total household income between the pre- and post-crisis periods can be written as:

$$\Delta Y_{c,h} = \sum_{i \in h} w_i^F F^{t=1} + \sum_{i \in h} w_i^{INF} INF^{t=1} + \Delta \pi_h + \Delta Tr_h \quad (16)$$

where  $\Delta$  is for the difference in the value in each associated variable between the post-crisis ( $t=1$ ) and pre-crisis ( $t=0$ ) periods.

## Welfare analysis

As mentioned previously, no attempt was made to model intra-household allocation decisions, but rather a uniform model of household bargaining was assumed such that consumption was shared equally among members of each household (using a suitable adult equivalent scale). As a result, adults and children were defined as poor if they belonged to a household where per-adult equivalent consumption expenditure was lower than the poverty line. The robustness of the results can be illustrated using a range of different poverty lines.

Different poverty measures (poverty headcount, poverty gap and severity of poverty) per Foster, Greer and Thorbecke (1984) are estimated for the pre-crisis and post-crisis periods. The FGT class of poverty measures take the form of:

$$FGT(\alpha) = \left( \frac{1}{\sum w_i} \right) \sum w_i \left[ 1 - \left( \frac{x_i}{z} \right) \right]^\alpha \quad (17)$$

where  $x_i$  is *per capita* expenditure for those individuals with weight  $w_i$  who are below the poverty line and zero for those above,  $z$  is the poverty line and  $\sum w_i$  is the total population.  $\alpha$  takes a value of **0** for the poverty headcount, **1** for the poverty gap, and **2** for poverty severity (squared poverty gap).

Given that the AIDS approach is adopted to model household consumption patterns, the poverty rate before the crisis is calculated by dividing individual consumption in real terms by the poverty line for the reference area and multiplying by 100, resulting in a new poverty line of 100 for all individuals (Bibi et al, 2009: 74). To calculate poverty rates after the crisis, individual consumption in real terms is re-estimated after replacing the price vector with the new vector of prices (obtained from the macro-model) and the change in total household income, i.e. the sum of the pre-crisis total household consumption and the change in household income obtained from the micro-simulation of labour market movements, and normalised by the adult equivalent scales. Given the new post-crisis real individual consumption, poverty rates are calculated and compared with the pre-crisis poverty rates.

## Appendix C: Estimated price and income elasticities

The full microeconometric modelling results are not all relevant to the child poverty outcomes. However, it is worth considering some of what was observed regarding this data.<sup>33</sup> Table C1 sets out the price and income elasticities from NIDS. One effect of the economic crisis was high food prices which would have had a large effect on the consumption patterns of the poor, considering the relatively high price elasticities observed in the first columns for many food items.

**Table C1: Price elasticity and income elasticity for certain consumption goods (at the 40th percentile of per adult equivalent income in each province)**

	(Own) PRICE ELASTICITY	INCOME ELASTICITY
MAIZE	-0.399	0.8317
RICE/BREAD	-0.745	0.7399
MEAT	-0.853	0.8173
FISH	-1.174	0.7079
VEGETABLES	-0.909	0.8039
FRUIT	-1.058	0.8985
OIL/FATS	-0.831	0.7197
DAIRY	-1.036	0.8781
EGGS	-0.920	0.7038
SUGAR	-0.866	0.7267
NON-ALCOHOLIC BEVERAGE	-1.042	1.0156
COFFEE/TEA	-0.902	0.6874
OTHER/UNSPECIFIED ELSEWHERE	-0.976	0.7064
ALCOHOLIC BEVERAGE	-1.092	0.9360
NON-FOOD	-0.824	1.1498

Source: Own calculations from NIDS

Thus far there have been no price data available to use in South African poverty studies. It is thus instructive to note that the poverty figures obtained when considering the price levels derived in the micro-modelling lead to the differential between rural and urban poverty narrowing compared to many other studies, indicating that relative prices tend to be lower in rural areas.

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33. The National Income Dynamics Study (NIDS) used in this analysis did not contain price data (the same applies for the larger IES 2005 which was also analysed in the same way). The following methodology was used to generate prices: in the case where a food category comprises more than one product, the price of the modal product within that food category was used. For example, the food category rice/bread (which comprises rice, bread, flour, biscuits/cakes and cereals) had rice as the modal product, therefore the price of rice was used to proxy the price of this food category. As no unit price information was available, and neither quantity data (as this would have allowed price to be derived by dividing total expenditure by quantity), unit price was proxied by minimum total expenditure. That is, as unit price had to be determined at the cluster level, the minimum reported expenditure within each cluster was taken to be the best approximation of the unit price for the respective food category in that district. In order to correct for what was considered to be wide price ranges, a further adjustment was made whereby prices that fell below the 5th and 95th percentile were truncated to the 5th and 95th percentile prices respectively (similarly, we might have truncated price data to fall within 2 standard deviations from the mean. Results were not significantly different when adopting either method). Adult equivalent income was normalised using a provincial “poverty line” set at the 40th percentile for the determination of the income and price elasticities.



