Income & Expenditure Inequality: Analysis of the NIDS Wave 1 Dataset

Discussion Paper no. 5

Arden Finn
Graduate student, University of Cape Town
ardenfinn@gmail.com

Murray Leibbrandt
Southern African Labour & Development Research Unit
Murray.Leibbrandt@uct.ac.za

Ingrid Woolard
Southern African Labour & Development Research Unit
Ingrid.Woolard@uct.ac.za

1. Introduction

The purpose of this report is to provide a snapshot of income and expenditure inequality in South Africa as measured by the 2008 data from the National Income Dynamics Study. While there are many ways in which to decompose and analyse inequality, the most common feature of post-Apartheid studies is the focus on changes in inequality by racial group. We remain with this precedent here although some mention is also made of inter-provincial inequality and inequality by geo-type[1].

Section 2 of this report presents an overview of aggregate income and expenditure inequality while Section 3 analyses inequality through the prism of race. Finally, Section 4 discusses two spatial dimensions of South African inequality by briefly looking at provincial and geo-type-level inequality.

All income and expenditure figures in the report refer to monthly household income/expenditure per capita. The figures of per capita household income and expenditure were constructed by dividing the final derived figures in the data[2] by the number of people living in the household. All of the analysis below makes use of post-stratified sampling weights in order to make the results reflective of the South African population, rather than the NIDS sample.

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[1] That is, urban formal, urban informal, rural formal and tribal areas
[2] Where household income and household expenditure are represented by variables w1_hhincome and w1_h_expenditure respectively

2. An Overview of Household per Capita Income/Expenditure Inequality

Table 1 below provides a broad breakdown of income and expenditure measures for each of the four racial groups that are found within the data.

Table 1 Income and expenditure measures by race

	Proportions			Mean		Median		Gini	
	Population	Inc	Exp	Inc	Exp	Inc	Exp	Inc	Exp
African	79.3%	43.5%	41.8%	934	775	441	359	0.60 (0.01)	0.59 (0.01)
Coloured	8.9%	8.6%	9.9%	1657	1633	953	849	0.53 (0.01)	0.57 (0.04)
Asian/Indian	2.6%	7.6%	7.4%	5057	4239	2360	2546	0.59 (0.03)	0.53 (0.02)
White	9.2%	40.3%	40.9%	7461	6572	5092	4588	0.48 (0.03)	0.45 (0.02)
Overall	100%	100%	100%	1705	1479	545	451	0.68 (0.01)	0.69 (0.01)

There is significant disparity between the population and income shares of the four racial groups. While the disparity may seem to have decreased slightly when compared to the 2005/2006 IES data[3] (Statistics South Africa, 2008), it is important to underline the fact that the reported IES income figure is comprised of labour market income and government grants only, while the NIDS 2008 income figure in this section is constructed by summing labour market income, government grants, implied rental income and a number of other sources of household income.[4] Household per capita income for those in the 90th percentile was, on average, 26 times more per month than it was for those in the 10th percentile. Average household per capita monthly income for Whites was eight times what it was for Africans. Finally, the inequality within each racial group – as measured by the Gini coefficient – is most prevalent amongst Africans and is much lower amongst Whites. The overall income Gini coefficient of 0.68 is somewhat lower than the income Gini reported in the 2005/2006 IES data which stands at 0.73, although this may be driven by the differences in methodology discussed earlier. Indeed, if we

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[3] In this data the African population and income shares were 79.4% and 41.2% respectively while the corresponding shares for Whites were 9.2% and 45.3%.

[4] These include income accruing from investments, income of a capital nature and remittance income. For a more detailed explanation of the derivation of the income variable used in this report please refer to Argent, J. & I. Woolard. July 2009. "Income: Report on NIDS Wave 1". *Technical Paper no. 3.*

define household income per capita in a manner closer to that of the IES by summing labour market income and government grants our Gini coefficient and 90/10 ratio do increase.

The same broad trends that are present in the income data can be seen in the expenditure data, though the mean and median figures are generally lower on the expenditure side. The overall mean household per capita expenditure stands at R1479 per month which is lower than the corresponding figure of R1705 per month that is reflected in the income data. The Gini coefficient in the expenditure analysis is not significantly different to the 0.68 measured by the income data. The ratio of expenditure in the 90th percentile to expenditure in the 10th percentile stands at 25. The disparity between the racial groups is similar to the corresponding income measure and remains stark with African and White expenditure-to-population ratios standing at 0.5 and 4.4 respectively.

Comparison to the 2005/2006 IES data (Statistics South Africa, 2008) at the expenditure level is not readily achievable due to differences in the construction of the expenditure data. In the IES, a household figure for expenditure was constructed by summing consumption expenditure and taxes. In the NIDS 2008 data, however, expenditure figures were calculated by summing food expenditure, non-food expenditure,[5] rental expenditure and implied rental expenditure.[6]

Figure 1, below, provides a breakdown of the components of total income by income decile. The aggregate is delineated by wage income, income from government grants, remittances received, income from investments, implied rental income and income from other sources.

As indicated in the figure, wages make up an increasingly large part of total income as we move upwards from the first decile. Wages reach the peak of their contribution in decile 9 where the share of total income is 74.2% before dropping to 69.7% in the top decile. Government grants make up a large fraction of total income for the poorest households, ranging between 30% and 50% amongst the poorest 5 deciles. Income received from investments constitutes a very small proportion of total income for the lower deciles. It does, however, provide the richest 10% of households with about 10% of their total income. Implied rental income maintains a relatively consistent importance in contributing to the welfare of households and remains in a band between 13.5% and 16% for deciles 5 to 10.

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[5] Non-food expenditure includes both consumption and investment spending.
[6] For a more detailed description of how expenditure figures were calculated and missing values dealt with, please see Finn, A., S. Franklin, M. Keswell, M. Leibbrandt & J. Levinsohn. July 2009. "Expenditure: Report on NIDS Wave 1". *Technical Paper no. 4.*

Figure 1: Components of income by income decile
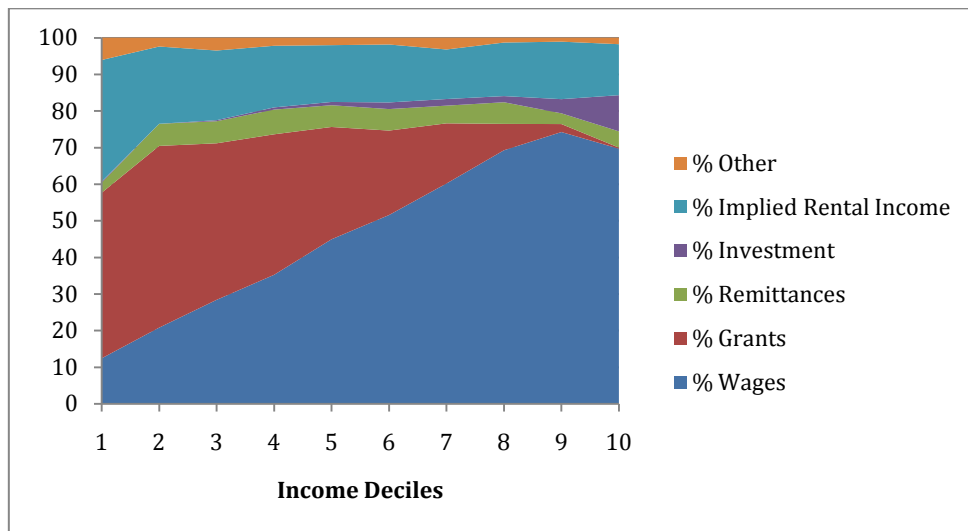
In Figure 2 below, household per capita expenditure is broken down into its three components by expenditure decile. These figures are arrived at easily because the food, non-food and rent/implied rent figures are simply aggregated in the calculation of the household-level expenditure variable.[7] As expected, food expenditure as a proportion of total expenditure falls as we move up the expenditure decile. In the poorest decile, over 53% of expenditure goes towards food items while the corresponding figure for the richest decile is just over 10%. The proportion of expenditure going towards rent (including implied rent) is very similar across all the deciles and makes up between one fifth and one quarter of expenditure.

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[7] For a full report on the derivation of the w1_h_expenditure variable please see Finn, A., S. Franklin, M Keswell, M. Leibbrandt & Jim Levinsohn. July 2009. "Expenditure: Report on NIDS Wave 1". *Technical Paper no. 4*.

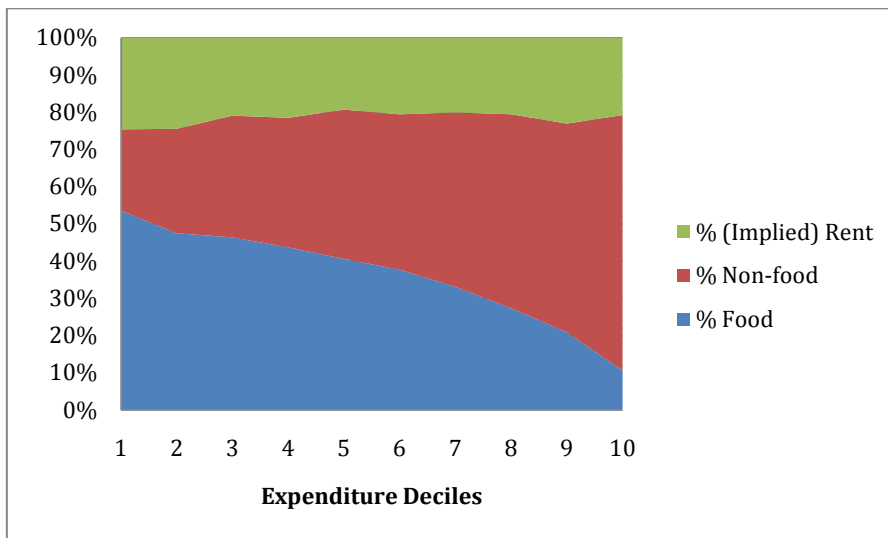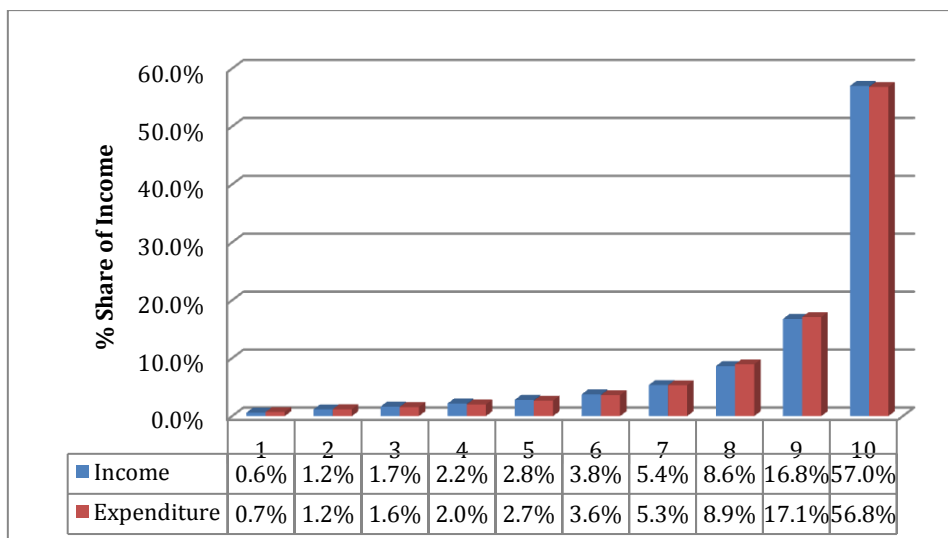**Figure 2: Components of expenditure by decile**

Figure 3 below confirms the presence of extreme income inequality in South Africa by showing that 57% of the household income per capita in the country accrues to those in the top decile. The poorest 50% of households comprise just over 8% of total income. This is slightly more top-heavy than the findings from the IES data of 2005/2006 which indicated that the top decile earned 51% of total reported household income (Statistics South Africa, 2008). However, as mentioned previously, the composition of per capita household income differs between the two surveys

Expenditure follows a very similar pattern to the corresponding figures from the income side, with more than half of total expenditure accruing to the top decile. Once again the lowest five deciles make up just over 8% of total expenditure.

Figure 3: Percentage shares of income and expenditure by deciles

	1	2	3	4	5	6	7	8	9	10
Income	0.6%	1.2%	1.7%	2.2%	2.8%	3.8%	5.4%	8.6%	16.8%	57.0%
Expenditure	0.7%	1.2%	1.6%	2.0%	2.7%	3.6%	5.3%	8.9%	17.1%	56.8%

A final broad look at inequality focuses on the mean education level attained by the head of the household for each income and expenditure decile. Figure 3 below confirms the prior expectation of an increase in the education variable for each decile. It is striking though that the mean education of the household head increases in a far more linear fashion for expenditure than it does for income, which is rather convex.

Figure 4: Average years of education of household head by income & expenditure deciles
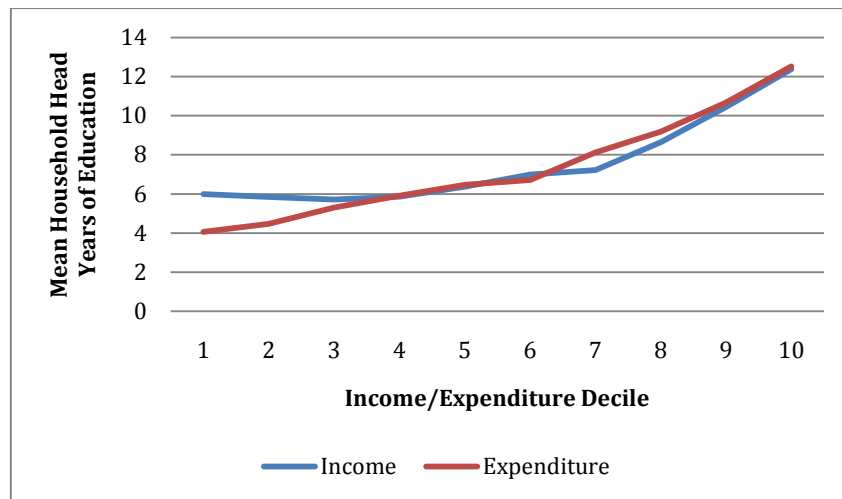
3. A Racial Analysis of Inequality

Table 2 below breaks per capita income down into deciles in order to reveal the racial components of each decile. As expected, given their dominance in the overall population, Africans make up the majority of the income deciles. This group's share, however, decreases markedly from the 8th decile until eventually falling below 30% amongst the wealthiest 10% of the population. As expected, given the contents of Table 1, Whites feature marginally in the lower deciles and become prevalent in the top two deciles, making up more than half of all those in the richest 10%.

Table 2: Racial composition of income deciles

Decile	African	Coloured	Asian/Indian	White
1	97.60%	1.70%	0.10%	0.60%
2	95.00%	5.00%	0.00%	0.00%
3	94.60%	4.30%	0.70%	0.40%
4	90.80%	9.00%	0.10%	0.10%
5	91.70%	6.50%	0.60%	0.20%
6	86.50%	11.00%	0.40%	2.10%
7	81.50%	10.10%	4.60%	3.80%
8	69.00%	19.30%	3.10%	8.60%
9	59.00%	15.50%	5.70%	19.80%
10	27.50%	6.60%	9.60%	56.30%

While the previous table gave the racial composition of each decile, Table 3 shows the decile composition of each race. That is, it gives a breakdown of how income is distributed within each race. Africans are spread relatively evenly across the deciles (which helps explain high within-group African inequality) while the other racial groups are concentrated around the upper deciles. Almost 60% of Asians/Indians are in the top two deciles and the corresponding share for the White population stands at over 80%.

Table 3: Income decile composition by race

Decile	African	Coloured	Asian/Indian	White
1	12.40%	2.00%	0.50%	0.70%
2	12.00%	5.70%	0.00%	0.00%
3	11.90%	4.90%	2.70%	0.50%
4	11.50%	10.10%	0.50%	0.10%
5	11.50%	7.30%	6.10%	0.20%
6	10.90%	12.40%	1.40%	2.20%
7	10.30%	11.30%	17.90%	4.10%
8	8.70%	21.60%	12.00%	9.50%
9	7.40%	17.40%	21.90%	21.60%
10	3.40%	7.30%	37.00%	61.10%
	100%	100%	100%	100%

Given the findings discussed so far, our *a priori* expectation should be that measured African inequality would be higher than White and Coloured inequality for any method of measuring inequality. Lorenz curve analysis offers a visual corroboration of this expectation by graphing curves for each racial group in the two curves below. The closer the curve is to the 45° line of perfect equality, the more equal the income distribution within that group. Figure 5 gives the Lorenz curves for all the racial groups and it confirms that income is more evenly distributed among Whites than among Coloureds and Africans. Due to the fact that the Asian/Indian curve crosses the African and Coloured curves, we cannot infer anything about overall Asian/Indian inequality dominance based on these curves alone. For the sake of easy interpretation, Figure 6 shows the Lorenz curves for Whites, Coloureds and Africans only, and confirms the finding that inequality is highest amongst Africans, then Coloureds and then Whites.

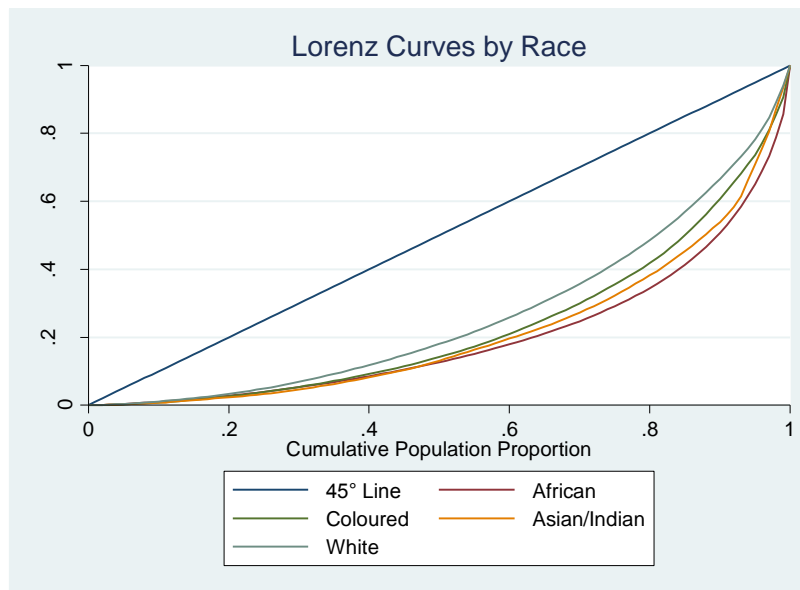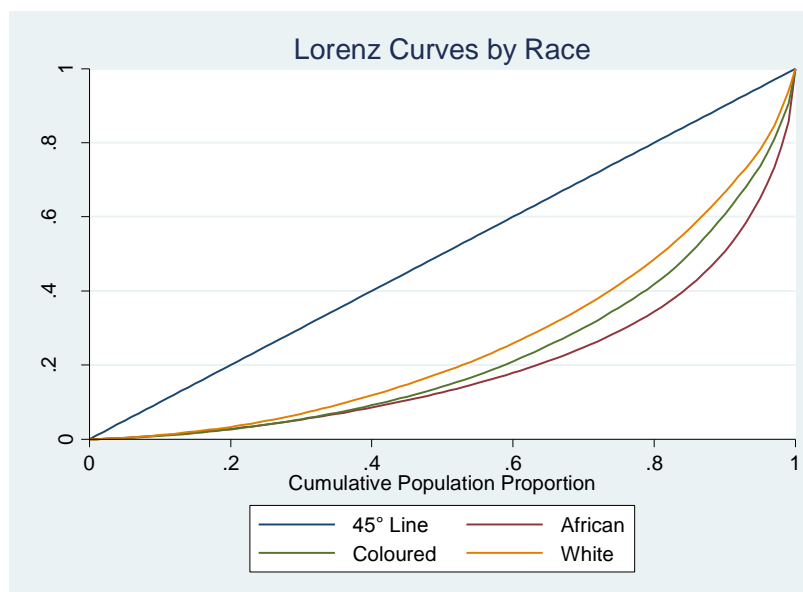**Figure 5: Income Lorenz Curves (All Races)**

Figure 6: Income Lorenz Curves (African, Coloured and White)

The above analysis is now repeated for household per capita expenditure. In Table 4 the composition of each expenditure decile is broken down into racial groups. Africans make up the vast majority of the first 7 deciles after which their share in the deciles drops off sharply and reaches 26.7% amongst the top decile, which is made up mainly of Whites. This expenditure picture shows higher African shares in deciles 7 and 8 and lower African shares in deciles 5, 6 and 9 than in the corresponding income analysis of Table 2.

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Table 4: Racial composition of expenditure deciles

Decile	African	Coloured	Asian/Indian	White
1	97.80%	2.20%	0.00%	0.00%
2	96.80%	2.90%	0.10%	0.20%
3	96.70%	3.20%	0.00%	0.10%
4	90.70%	9.00%	0.30%	0.00%
5	88.40%	7.10%	2.60%	1.90%
6	85.10%	12.90%	2.00%	0.00%
7	86.00%	12.10%	1.00%	0.90%
8	72.30%	15.10%	4.20%	8.40%
9	52.20%	16.60%	7.00%	24.20%
10	26.70%	8.00%	8.70%	56.60%

The table below provides an indication as to how expenditure is distributed within each racial group. Most Africans fall within the first eight deciles and the Coloured population is clustered around deciles six to nine. More than 60% of Whites are in the top decile. This is very similar to the equivalent income decile analysis as depicted in Table 3.

Table 5: Expenditure decile composition by race

Decile	African	Coloured	Asian/Indian	White
1	12.40%	2.50%	0.00%	0.00%
2	12.30%	3.30%	0.20%	0.20%
3	12.20%	3.70%	0.00%	0.10%
4	11.40%	10.00%	1.30%	0.00%
5	11.20%	8.00%	10.00%	2.10%
6	10.70%	14.40%	7.90%	0.00%
7	10.80%	13.60%	3.70%	0.90%
8	9.10%	16.90%	16.30%	9.20%
9	6.60%	18.70%	27.30%	26.40%
10	3.30%	8.90%	33.30%	61.10%
	100%	100%	100%	100%

An analysis of Lorenz curves confirms that African expenditure inequality dominates that of Coloureds and Whites. Once again, due to the fact that the Asian/Indian curve crosses the curves of all the other races, we cannot infer anything about overall Asian/Indian inequality dominance on this basis alone. For the sake of easy interpretation, Figure 8 shows the Lorenz curves for Whites, Coloureds and Africans only, and confirms the finding that inequality is highest amongst Africans, then Coloureds and then Whites.

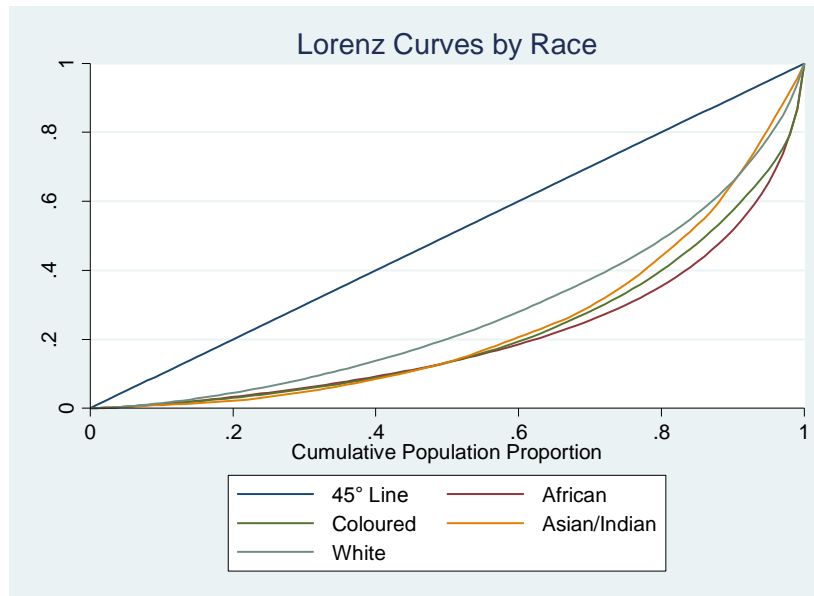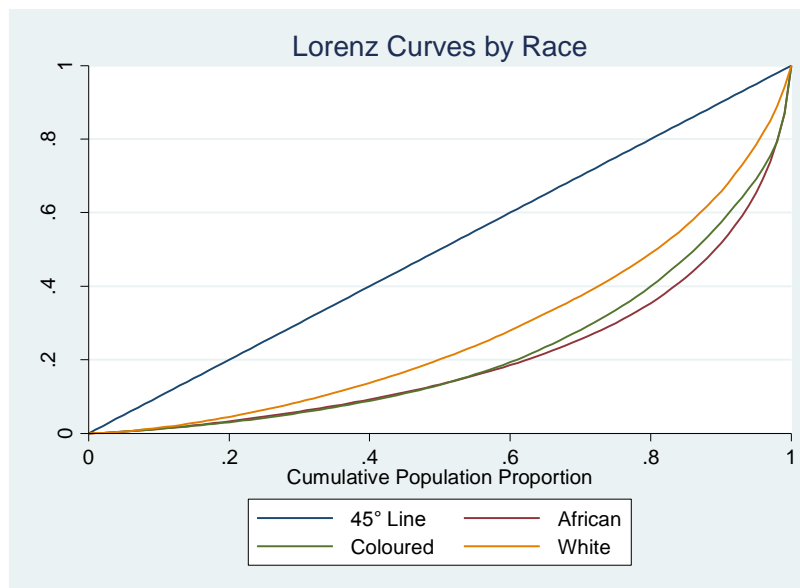**Figure 7: Expenditure Lorenz Curves (All Races)**

Figure 8: Expenditure Lorenz Curves (African, Coloured and white)

The concluding table on the dynamics of income and expenditure inequality by race is given in the table below. In this table we make use of two indices drawn from the Generalised Entropy measures of inequality; the mean logarithmic deviation, also known as GE(0), and the Theil measure, also known as GE(1). As we would expect, given the Lorenz curve analysis above, Table 6 shows that for both of these measures inequality amongst Africans is the highest of all the racial groups. A useful property of these Generalised Entropy measures of inequality is that

they are decomposable into a share of the total measured inequality that is attributable to inequality within each of the racial groups and a share that is attributable to inequality between racial groups.[8] The latter is a representation of the influence of race in driving inequality. For example, in Table 6, we see that 58.6% of overall income inequality is being driven by differences within races, while the remaining 41.4% is being driven by income inequality between racial groups when using the GE(1) measure. This result differs somewhat from Hoogenveen et al. (2006) which finds that between-race income inequality made up 33.2% of total racial inequality on the basis of the 2000 IES data.

From the perspective of expenditure, both Theil measures are highest for Africans and lowest for Whites. The "Between" component of racial expenditure inequality is roughly 2% higher than the corresponding measure for income inequality.

Table 6: General entropy decomposition of income and expenditure by race

	Income GE(0)	Income GE(1)	Expenditure GE(0)	Expenditure GE(1)
Overall	0.94	0.99	0.93	0.98
African	0.65	0.75	0.62	0.71
Coloured	0.51	0.52	0.59	0.64
Asian/Indian	0.68	0.65	0.57	0.47
White	0.44	0.39	0.38	0.36
Within	0.62	0.58	0.59	0.55
	66.00%	58.60%	63.40%	56.10%
Between	0.32	0.41	0.34	0.43
	34.00%	41.40%	36.60%	43.90%

In a recent article (Elbers, Lanjouw, Mistiaen, & Özler, 2008) the conventional interpretation of the between-group measures of the general entropy decomposition of inequality is interrogated. It is posited that it may be instructive to view between-group inequality as a percentage of the maximum possible level of between-group inequality that can be counterfactually constructed from the data while retaining the same number of groups and their relative sizes as well as the same income distribution. A key idea behind this assertion is the fact that total inequality is effectively "a measure of between-group inequality that would be observed if every household in the population constituted a separate group" (Elbers *et al*, p. 231). The method of calculating this new measure is relatively simple and involves replacing

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[8] See Sen (1997) for a clear discussion of the Generalised Entropy class of inequality measures as well as their decomposition into between and within group components.

total inequality in the denominator of the conventional ratio with the maximum between-group inequality [that can be obtained, given the criteria above]" (Elbers *et al*, p. 233). This has the strong advantage of allowing for a more natural comparison of inequality across different times and settings because the measure itself is normalised by parameters present in the data.

Calculating the achieved between-group inequality as a percentage of the maximum possible between-group inequality yields some very interesting results. The maximum between-group income inequality measures for GE(0) and GE(1) are 0.68 and 0.80 respectively. Therefore, given our current measures of between-race inequality, we see that South African society is currently 47.1% on the "road" to maximum between-race income inequality according to GE(0), and 51.3% of the way to maximum between-race inequality according to GE(1). This makes for a more sobering interpretation of inequality dynamics between the various racial groups in the country than is the case if only the simple "between" and "within" measures are used.

After applying the technique to the expenditure data, we find that the measured between-group inequality as a percent of the maximum possible inequality (while maintaining the distribution and sizes of the groups in the data) yields similar results to the income decomposition. In the current case South Africa's measured between-group inequality is 50% and 53.8% of the maximum for the GE(0) and GE(1) measures respectively. This is compared to the share calculated by Elbers *et al* which stands at 56.4% for the GE(0) measure. However, Elbers *et al* measures inequality as a function of per capita consumption expenditure rather than an aggregate per capita expenditure figure.

4. A Spatial Analysis of Inequality

We move away from race to present a spatial view of inequality by describing the situation on a provincial level. Table 7 presents population and income shares, mean and median per capita monthly incomes and Gini coefficients for each of the nine provinces. Unsurprisingly, Gauteng, the Western Cape and KwaZulu-Natal dominate the income shares in the country, although KwaZulu-Natal's income share is below its population share in the country. Average household per capita income is highest in Gauteng and lowest in the Eastern Cape. The Eastern Cape's mean and median figures for household income per capita reflect the findings of the poverty report by showing very low values for both of these measures. The province's income share is about half of its population share. Income inequality is high in all nine provinces but is especially marked in KwaZulu-Natal where the Gini coefficient stands at 0.73.

Although the mean and median expenditure figures are generally lower than those for income the same trend between the provinces is evident. KwaZulu-Natal remains the most unequal province with the expenditure Gini coefficient rising to a very large 0.77.

Table 7: Income and expenditure measures by province

	Proportion			Mean		Median		Gini	
	Population	Inc	Exp	Inc	Exp	Inc	Exp	Inc	Exp
Western Cape	10.80%	14.90%	17.30%	2344	2362	1120	1003	0.60 (0.01)	0.63 (0.01)
Eastern Cape	13.50%	6.70%	7.30%	840	801	320	277	0.66 (0.02)	0.68 (0.02)
Northern Cape	2.30%	2.00%	1.90%	1460	1181	750	579	0.58 (0.01)	0.56 (0.01)
Free State	5.90%	5.30%	4.50%	1522	1133	558	474	0.67 (0.03)	0.62 (0.01)
KwaZulu-Natal	20.80%	15.80%	19.60%	1300	1390	384	294	0.73 (0.02)	0.77 (0.02)
North West	7.00%	6.20%	6.40%	1507	1348	650	518	0.63 (0.02)	0.64 (0.01)
Gauteng	21.40%	34.20%	28.70%	2725	1986	1000	860	0.66 (0.01)	0.60 (0.01)
Mpumalanga	7.40%	8.80%	8.40%	2028	1692	594	545	0.68 (0.01)	0.65 (0.01)
Limpopo	10.90%	6.10%	5.90%	961	802	373	319	0.68 (0.03)	0.65 (0.02)

Finally, Table 8 presents another spatial view by breaking down population and income dynamics on the basis of the geo-type in which the dwelling unit is situated. Urban Formal and Tribal areas are the largest geo-types in the population, accounting for over 80% of all

households in the sample. Interestingly, the income-to-population ratios displayed by these two geotypes are vastly different, with ratios of 0.3 and 1.7 for Tribal and Urban Formal respectively. The Gini coefficient in Urban Formal reflects the high level of urban inequality relative to other areas of the country. Average household per capita incomes in Urban Formal areas are more than two-and-a-half times what they are in the next highest income area, namely Rural Formal. This general dynamic is reflected when comparing median incomes across the geo-types as well.

Once again the expenditure figures are always lower than the income ones. The Gini coefficients for tribal and urban formal households both fall when considering expenditure rather than income.

Table 8: Income and expenditure measures by Geo-type

	Proportion			Mean		Median		Gini	
	Population	Inc	Exp	Inc	Exp	Inc	Exp	Inc	Exp
Rural Formal	6.60%	4.20%	3.90%	1058	869	623	423	0.53 (0.01)	0.59 (0.02)
Tribal	33.70%	10.00%	9.60%	512	424	302	253	0.52 (0.02)	0.50 (0.01)
Urban Formal	48.60%	81.30%	82.00%	2846	2493	1120	1023	0.65 (0.01)	0.63 (0.01)
Urban Informal	11.10%	4.50%	4.50%	709	600	437	380	0.53 (0.01)	0.49 (0.01)

References:

Elbers, C., Lanjouw, P., Mistiaen, J., & Özler, B. (2008). Reinterpreting between-group inequality. *Journal of Economic Inequality , 6* (3), 231-245.

Hoogenveen, J., & Ozler, B. (2006). Poverty and inequality in post-apartheid South Africa: 1995-2000. In H. Bhorat, & R. Kanbur, *Poverty and Policy in Post-Apartheid South Africa.* Cape Town: HSRC Press.

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