THE RELATIONSHIP BETWEEN UNEMPLOMENT AND EARNINGS INEQUALITY IN SOUTH AFRICA

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ABSTRACT

Unemployment and earnings inequality have moved closely together in South Africa in recent years, suggesting that there may not be a trade-off between them as the literature generally suggests. This article explores the relationship between unemployment and earnings inequality in South Africa, specifically investigating the extent to which changes in unemployment can account for changes in earnings inequality. Decomposing overall income inequality by factor source shows the overwhelming importance of earnings in income inequality more generally. Decomposing earnings inequality by employment status reveals the centrality of unemployment in accounting for the level and trend of earnings inequality. The distribution of employment in the formal and informal sectors is found to be of lesser importance in explaining earnings inequality, as is wage dispersion within each of these categories. The findings point to the critical importance of reducing unemployment in South Africa if the extremely high levels of inequality are to be addressed.

1. INTRODUCTION

There are a few countries more unequal than South Africa, and a few countries with higher rates of unemployment, but the combination of inequality and unemployment is almost uniquely high in South Africa. The levels and racialised character of both inequality and unemployment in South Africa are undoubtedly to a large extent a product of the country's apartheid legacy, in terms of factors such as the distribution of wealth, the skills profile of the labour force, and the

highly capital-intense production structure. Both unemployment and inequality actually increased in the years following the demise of apartheid in 1994, although both appear to be falling slowly over the past few years.

This article investigates particular aspects of earnings inequality in South Africa, focussing on the ways in which the rate of unemployment, the formal/informal composition of the employed, and wage dispersion amongst each of the formal and informal sectors contribute to earnings inequality. The methodology used to explore these questions could also be relevant to empirical analysis of other countries.

Section 2 distils and critiques some insights and evidence from the international literature, as well as reviewing some key findings on the relationship between labour market factors and inequality from the South African literature. Section 3 briefly analyses salient aspects of the level and trends in earnings inequality in South Africa. A decomposition of income inequality by factor source, to determine the importance of earnings in overall income inequality, is discussed in section 4. The empirical analysis of the relationship between particular aspects of the labour market and earnings inequality is presented in Section 5. This analysis centres around static and dynamic decompositions of earnings inequality according to various labour market categories. Section 6 concludes and draws out some possible policy implications.

2. LITERATURE REVIEW

Two main issues are addressed in the dominant literature on unemployment and inequality. The first of these is the way in which unemployment and inequality react to underlying changes in the economy (for example a trade or technological shock). A second major focus in the literature is the effects of changes in unemployment on income inequality.

In terms of the first of these issues, there is a prominent view in the international literature that increases in unemployment and wage inequality are 'alternative' results of changes in the structure of the demand for labour. This could imply a trade-off between increasing income inequality (specifically wage inequality) and increasing unemployment.

The notion of a trade-off between increasing income inequality and increasing unemployment has been considered to explain the differences in patterns of unemployment and

income or wage inequality when comparing the US and Europe, and to a lesser extent the US and Canada (see for example Storer and Van Audenrode (1998) and Ayala et al (2002)). Rates of unemployment tend to be lower in the US but wage dispersion considerably higher. Furthermore, in a dynamic sense adverse shocks tend to result predominantly in increases in wage dispersion in the US, but primarily in increases in unemployment in the comparator countries. Unemployment also tends to be of longer duration in Europe than in the US. Countries in which wage inequality increased the most have tended to have lower and less persistent unemployment

Gottschalk and Smeeding (1997) summarise the 'stylised facts' emerging from the literature on the relationship between labour markets and inequality as follows. Firstly, countries with centralised bargaining systems (such as Germany or Sweden) have greater equality of earnings than do countries with less centralised bargaining systems (such as the US or Canada). Secondly, earnings inequality increased in the majority of industrial countries during the 1980s, but most in the US and UK and least in the Nordic countries. Thirdly, increases in demand for skilled labour and differences across countries in growth of supply of skilled workers explain a large part of the differences in trends in returns to education and experience. And fourthly, institutional constraints on wages limited the increases in inequality, more so in countries with stronger constraints.

An adverse trade or technology shock may lead to some combination of lower wages in existing jobs; loss of some existing jobs and re-employment in lower-wage jobs; and/or loss of some existing jobs without replacement. Insofar as the jobs affected are disproportionately low-wage jobs, any of these outcomes will tend to increase inequality. The particular combination of these three outcomes that an economy experiences in response to an adverse shock depends on various institutional features.

In this type of approach in the literature, unemployment and inequality are essentially viewed as alternative equilibrating mechanisms to technological, trade, or other shocks that affect the relative demand for different types of labour.

However, this apparent trade-off between increases in unemployment and inequality is not unidimensional or linear. There are also important exceptions, such as the UK in which wage

inequality widened yet unemployment remained high, whereas Germany has had relatively low wage inequality as well as unemployment.

Furthermore, to the extent that unemployment is a structural macroeconomic problem, and particularly to the extent that it is a product of problems in macroeconomic management, it cannot be considered in narrow labour market terms or as a result of excessive wages. In addition to the fact that the solutions to unemployment are not necessarily to be found in the labour market, attempting to deal with unemployment purely in this realm is likely to heighten inequality.[1]

The nature and extent of the perceived 'trade-off' between changes in unemployment and in inequality are also subject to policy interventions. The vulnerability of a country to a shock is affected by previous policy choices (for example, around financial and capital account liberalisation). In addition, the way in which a shock affects an economy is partially subject to policy mediation. The distributional impact of any exogenous shock is not predetermined. Even if the shock would have primarily or disproportionately affected low income-earners, some of these costs can be redistributed (through fiscal and other measures) such that the net impact on inequality is mitigated.[2]

However, in the absence of specific measures to counteract this, a change in relative labour demand in which the demand for unskilled or low-skilled labour falls is indeed likely to result

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[1] As Glyn (1995) puts it,

> If substitutability [between skilled and unskilled labour] is not high then it is clear that the distributional implications of relying on wage flexibility are highly inegalitarian – the worse-paid sections of the population have to bear the cost of reducing unemployment via substantial cuts in their wages while the better-off sections of society benefit from the cheaper services.

[2] For instance, the effects of an adverse trade shock (in particular one that results in a reduction of demand for less skilled labour) on employment and distribution are subject to policy intervention in various ways. Firstly, even given lower costs of production of labour-intensive goods in other countries, the degree of import penetration of such goods in the home market is contingent on the trade regime and specifically on tariff and non-tariff barriers. Secondly, industrial and other policies mediate the degree and nature of the impact of increased or potentially increased import penetration on domestic industry. Thirdly, skills levels are not static, especially in the medium- to long-term and changing the skills profile of the labour force would influence the results of the shock. Fourthly, the extent to which changes in relative labour demand actually translate into adverse distributional consequences is dependent on the distributional regime and subject to fiscal and other interventions. The fact that low-skilled labour may be directly affected by an adverse shock need not mean that this group actually bears the costs, although they are likely to do so unless there is specific intervention to the contrary.

either in higher rates of unemployment or in increased wage inequality, or more likely in a combination of these. The actual mix of increased unemployment and wage dispersion is likely to be mediated by institutional factors. These factors relates to labour market structure in particular, such as the bargaining system, the duration of contracts and of wage agreements, the system of unemployment benefits, a minimum wage, and so on.

We identified a second relevant issue in the international literature as the effects of changes in unemployment on inequality. The international literature consistently finds a negative causal relationship between unemployment and inequality. Time-series analysis of the effects of unemployment on inequality within countries generally finds that increases in unemployment worsen income inequality.

In their seminal paper, Blinder and Esaki (1978) find that unemployment has clear disequalising effects on income distribution in the US from 1947-1974. Reviewing the literature on the relationship between macroeconomic conditions and income distribution, Mocan (1999) concludes that 'the consensus has been that income inequality is countercyclical in behaviour, i.e., increases in unemployment worsen the position of low-income groups.' Mocan's econometric analysis of US data over the period 1949-1994 indicates that an increase in structural unemployment reduces the income shares of the bottom three quintiles, and may do so for the second highest quintile as well, but is associated with an increase in the income share of the top quintile.

Björklund (1991) finds that higher unemployment significantly raises the income share of the top quartile in Sweden between 1960 and 1973. In one of the few studies concerning developing countries, González and Menendez (2000) look at the effects of unemployment on labour income inequality in Argentina over the period 1991-1998. González and Menendez find that 43% of the total increase in inequality can be explained by the increase in unemployment.

While the South African literature does not directly address the questions investigated here, several studies do find labour market factors to be important in explaining inequality.

Whiteford and Van Seventer (2000) argue that increasing unemployment between 1991 and 1996 contributed to increasing inequality. Trade liberalisation shifted the skills composition of the economy in favour of higher skills, which they suggest also raised inequality.

Leibbrandt et al (1996) use data derived from the (non-official) 1993 Living Standards Measurement Study Survey to decompose the Gini coefficient by income source. They find that wage and salary income is not only the most important income component but is also the component that contributes most to overall income inequality amongst African households. This is confirmed by Bhorat et al (1999), who apply the same technique to the 1995 Income and Expenditure Survey (IES) for all households, and by Leite et al (2006) for the 1995 and 2000 IES, although the magnitudes of the results vary somewhat.

Leibbrandt and Woolard (2001) find labour market activities to be significant contributors to households' movements into and out of poverty in the Kwazulu-Natal province. Specific labour market characteristics (number of persons in the household with jobs, and number of unemployed persons in the household) are found to be very important determinants of changes in adult equivalent income more broadly.

Leite et al (2006) study post-Apartheid earnings inequality in South Africa and find several results germane to the relationship between labour markets and inequality. They decompose earnings inequality along various lines, including whether the person is an employee, self-employed, or both. They find that between-group inequality according to these categories accounted for about 8.6% of inequality in 1997/1998, but this declines to zero or close to zero by 2004. They also undertake the same decomposition in terms of occupation, finding about 40% of earnings inequality to be accounted for by inequality between occupations (and the remaining 60% by inequality within occupations). Further, they find that increasing inequality within occupations contributed to the rise in earnings inequality between 1995 and 2004.

Of the studies that consider the relationships between labour markets and inequality in South Africa, strong linkages are found. The South African literature does not however extend to the more recent data utilised in this study. Further, it does not directly address the issues investigated here, specifically in terms of quantifying the contribution of employment status as well as of the formal/informal structure of employment to earnings inequality.

3. INEQUALITY IN SOUTH AFRICA: AN EMPIRICAL REVIEW

As background to the empirical analysis of the relationship between unemployment (and other aspects of labour force structure) and earnings inequality in section 5, here we empirically review some relevant aspects of inequality and unemployment in South Africa. We compare the levels of inequality and unemployment in South Africa to those found in other countries; summarise the level of earnings inequality in South Africa according to various measures; examine the changes in earnings across the earnings distribution spectrum for the recent period for which data is available; and consider recent trends in both earnings inequality and unemployment.

## *3.1 International comparison*

To begin by contextualising inequality and unemployment in South Africa in an international context, figure 1 shows inequality and unemployment rates for 127 countries. Measurement and reporting is not uniform internationally and hence this data is not entirely comparable[3], but they are at least indicative of international patterns.

South Africa ranks among the most unequal countries in the world as well as amongst the countries with the highest rates of unemployment. Other countries with extremely high levels of unemployment include Iraq, Armenia, Namibia, some small islands such as Reunion and the Marshall Islands, and the West Bank. However, all of these countries or territories have lower levels of inequality than does South Africa. South Africa and Lesotho (the point on the chart close to South Africa) are the only countries with extremely high levels of both inequality and unemployment, and stand out clearly as outliers.

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[3] The observations are not from the same year for each country (as suitable surveys are generally not conducted annually and there is a lag in reporting results) but those shown here are the most recent for each country, restricted to those after 1995. Separate series are shown for each of gross earnings; gross income; disposable income; and consumption or expenditure, with observations not being directly comparable across these series (for instance, as would be expected the measures for disposable income are typically below those for gross income, given that taxes tend to have an equalising impact).

At the opposite end of the spectrum are countries such as Norway, Pakistan, Bangladesh, Hungary, Slovenia, and Japan, which all have relatively low unemployment as well as low inequality. Rates of unemployment and inequality are however not closely correlated (at least not when inequality is measured with the Gini). Albania, Slovakia, Croatia and Iran are examples of countries which are have very high unemployment but comparatively egalitarian income distribution. On the other hand there are countries that are highly unequal yet which have relatively low rates of unemployment, such as Malawi, Singapore, Guatemala, and Malaysia.

Figure 1: International comparison of inequality and unemployment
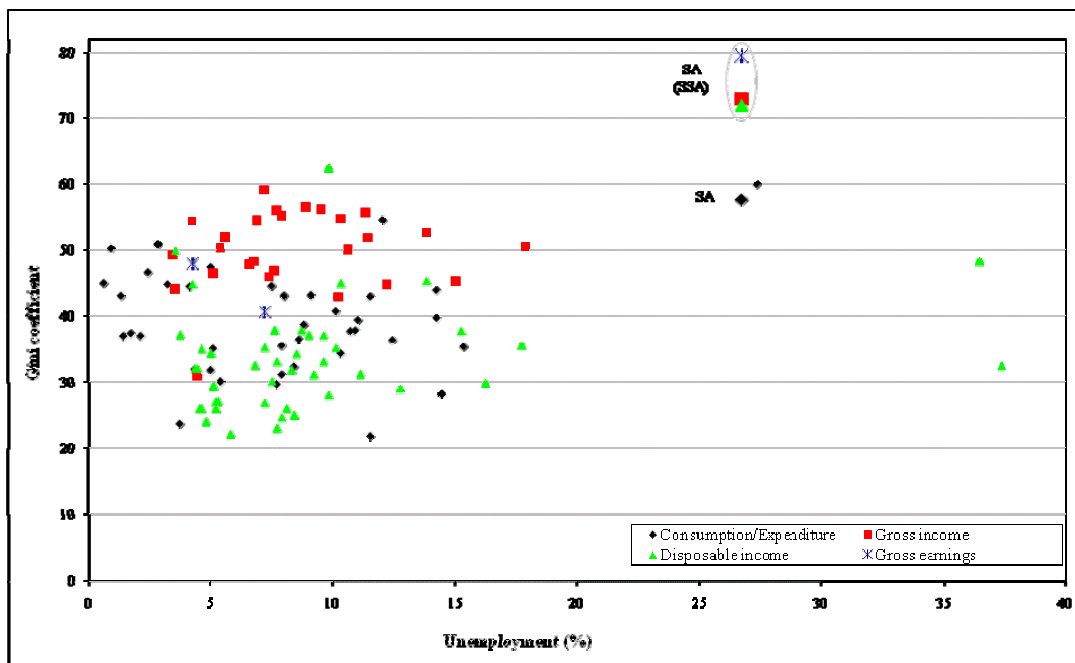
Notes:

The three points labelled 'SA (SSA)' use the most recent national data published by Stats SA, for both unemployment and three measures on inequality. The lower point for South Africa (marked 'SA') is based on the same international data sources as for the rest of the countries.

Data derived from WIDER World Income Inequality Database 2; ILO Key Indicators of the Labour Market; Statistics South Africa (2008a); and Statistics South Africa (2008c).

3.2 Earnings inequality in South Africa

Table 1 below summarises the current level of earnings inequality in South Africa, using several different measures of inequality.[4] Earnings inequality is extremely high: for instance, the Gini coefficient of earnings amongst the employed is 0.63.

Table 1: Earnings inequality in South Africa, 2007

|	All employed	Full labour force	All working age adults
Gini coefficient	0.633	0.714	0.815
Mean log deviation	1.739	3.986	6.597
Theil index	0.803	1.051	1.485
Half coefficient of variation squared	1.689	2.287	3.798
Relative mean deviation	0.473	0.539	0.648

Notes:

'All employed' refers to all people classified as employed. 'Full labour force' refers to the employed and unemployed (official definition) aged between 15 and 65 inclusive. 'All working age adults' refers to everyone aged between 19 and 65 inclusive. The latter two categories include people receiving zero earnings; the measures of inequality shown here are calculated by imputing nominal earnings of R0.01 ($\pm$\$0.001) per person per month for computational reasons.

Earnings grew the most for those in about the lower third of the distribution, but excluding the lowest end, in recent years. Growth incidence curves of earnings in South Africa between 2001 and 2007[5] are shown in figures 2 and 3. Surprisingly, earnings appear to have fallen in real terms for much of the upper half of the distribution. The top end of the distribution however benefited from earnings growth above that of the rest of the top half of the distribution. To the extent that there has been some 'redistribution' towards the lowest earners, the relative losers have been not the high income earners but the middle and upper-middle.

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[4] Unless otherwise indicated, all data on earnings in South Africa is derived from the Labour Force Survey (LFS), a national biannual survey conducted by the country's official statistics agency, Statistics South Africa. Appendix 1 contains more information about the LFS and about the processing of the raw data to prepare it for this empirical analysis.

[5] Comparable data is unfortunately not available for earlier years.

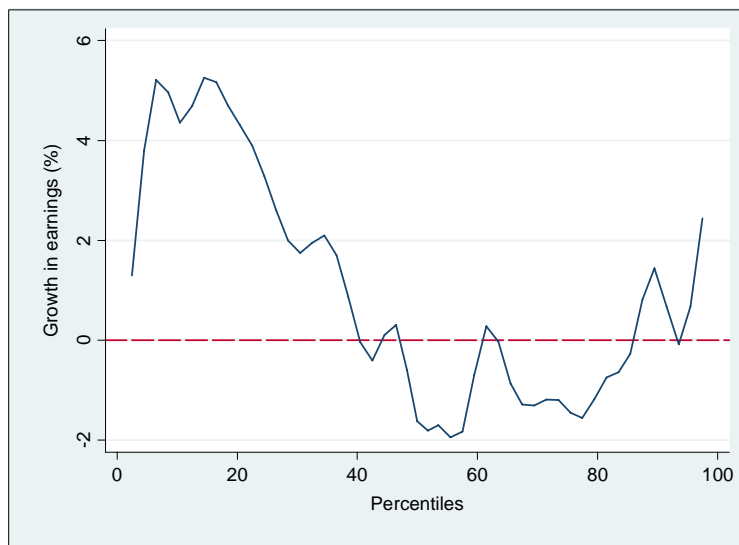**Figure 2: Growth incidence curve of earnings, 2001-2007**
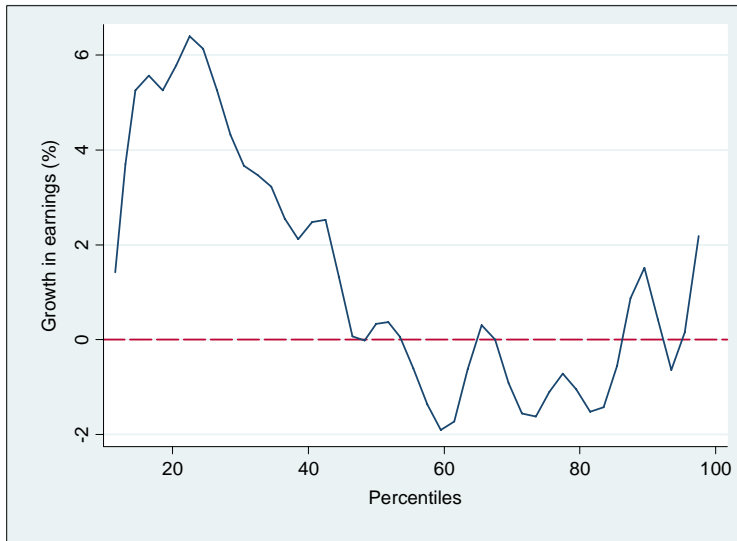
Notes:

Growth incidence curve of earnings amongst the employed.

2001 data inflated to 2007 prices using CPI.

Curve smoothed into 25 bands.

Note that the x-axis begins at around 10% since approximately a tenth of

those classified as employed report zero earnings.

Figure 3: Growth incidence curve of earnings excl. zero-earners, 2001-2007

Notes:

Growth incidence curve of earnings amongst the employed.

2001 data inflated to 2007 prices using CPI.

Curve smoothed into 25 bands.

These trends are surprising and challenge a common perception that those in the lower half of the earnings distribution fared relatively badly. There have not been significant shifts in the occupational composition of the employed during this period that might explain these changes in earnings distribution. Although a determination of the causal factors behind these changes is beyond the scope of this paper, one possible explanation is the gradual erosion of the earnings premium accruing to whites, with the possible exception of those at the top. The upper-middle parts of the earnings distribution are where most whites are located. Although whites still earn significantly more than blacks (even for similar types of jobs), this racial wage premium in the labour market is likely to be declining as the effects of apartheid become gradually less pronounced. The trends may also be related to changes in the premium to education, for instance a decline in the returns to completed secondary school education.

It is also worth noting that earnings growth is rather low relative to GDP growth. Real annual GDP growth averaged 4.52% during this period, which is significantly higher than the average annualised growth in earnings experienced in most of the earnings distribution.
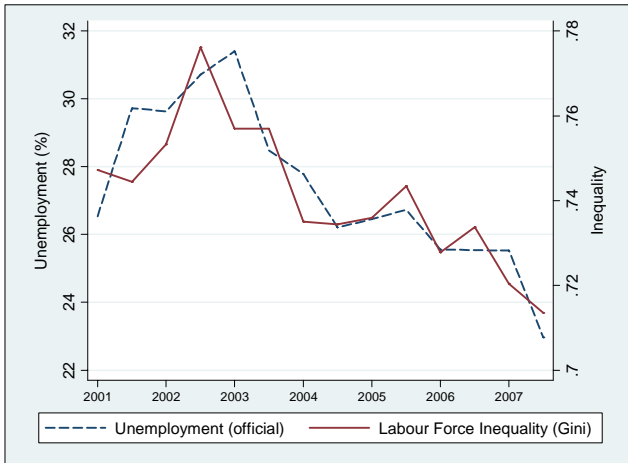
3.3 Trends in inequality and unemployment

Both inequality and unemployment peaked in late 2002/early 2003 and have since been declining, although at a slow pace given their severity. Unemployment currently stands at 23.0% using the official definition, or 35.8% using the expanded definition.[6]

A close relationship between unemployment and earnings inequality is evident from figure 4 below, both among the labour force and among all 'working age' adults. However, these close relationships would be partially explained by the fact that higher unemployment means that a lower proportion of the labour force and of the working age adult population receive earnings and hence inequality would be higher in a straightforward 'compositional' sense.

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[6] The difference between the official and expanded definitions of unemployment is that the former excludes from the labour force people who have not looked for work or taken steps to start a business in the four weeks prior to the survey interview ('discouraged job-seekers'). Both measures are limited to people between the ages of 15 and 65 (inclusive) who did not have a job or business in the seven days prior to the interview and are available to take up work within two weeks of the interview. A person need only have 'worked' for an hour in the previous week to be classified as employed, and this 'work' includes activities such as helping unpaid in any household business; any work on the household's land or looking after animals; any construction or major repair work on their home; or catching animals for household food.

Figure 4: Unemployment and earnings inequality, 2001-2007

Unemployment and labour force inequality   Unemployment and working age inequality

Note:

Labour force inequality refers to the inequality in earnings amongst all members of the labour force (employed and unemployed); working age inequality refers to earnings inequality among the population aged 19-65 (inclusive). Unemployment rates shown here are for official unemployment.

Figure 5 below therefore shows the relationship between unemployment and earnings inequality *amongst the employed only*. These exclude the direct or compositional effect of unemployment on labour force or adult earnings inequality. There still appears to be a very clear positive relationship between unemployment and earnings inequality amongst the employed, with all four measures on inequality shown. As would be expected, the relationship is not as strong as with earnings inequality for the entire labour force or adult population. Nonetheless, the close positive relationship between unemployment and earnings inequality amongst the employed suggests that there is a relationship beyond the 'compositional' channel.

It is remarkable how closely unemployment and earnings inequality have moved together over time, given that there is no *a priori* reason to expect that this would be the case. There is evidence from the international literature of a positive relationship between unemployment and income inequality, but this is not particularly surprising given that the unemployed are included in the measure of income inequality and their unemployment status would directly affect their income. What we find here, however, is a positive relationship between unemployment and earnings inequality amongst the employed. This goes against the idea of a trade-off between
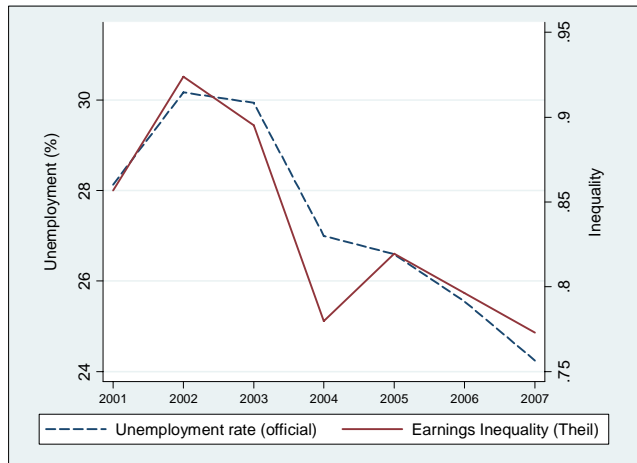
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unemployment and earnings inequality (at least for the period and over the range for which data is available).

Figure 5: Unemployment and earnings inequality amongst the employed, 2001-2007
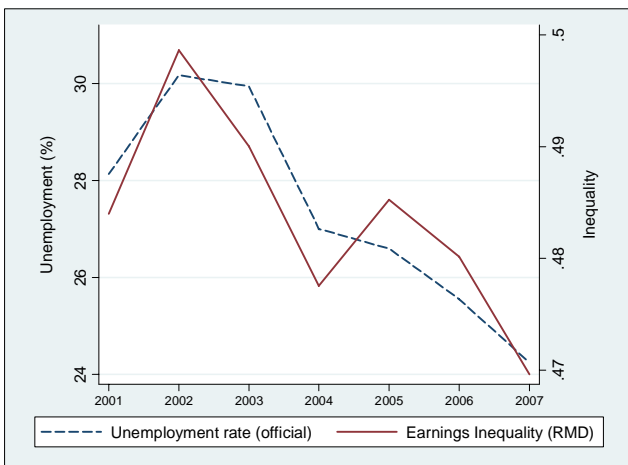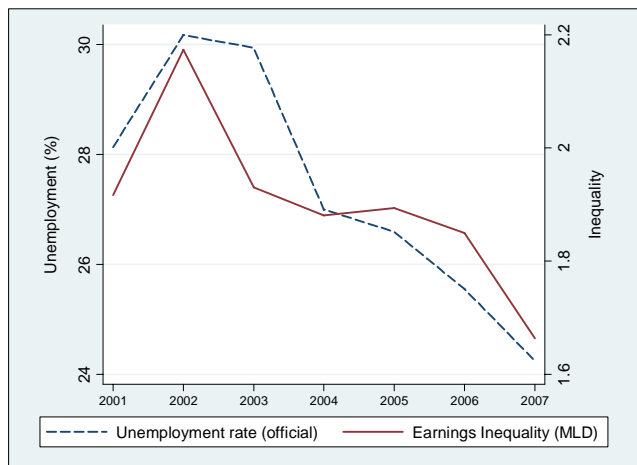
Gini
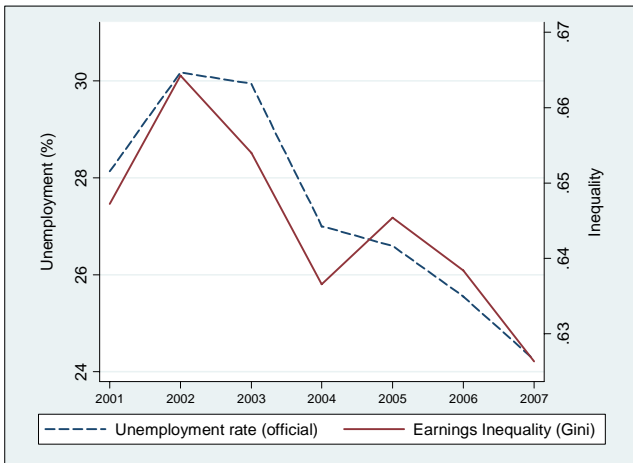
Theil

Mean log deviation

Relative mean deviation

4. HOW MUCH DO EARNINGS FROM WORK EXPLAIN OF OVERALL INEQUALITY?

While the focus of this article is on earnings inequality and specifically the extent to which various labour market factors account for earnings inequality, this section locates earnings inequality in the context of broader income inequality.

Income from work (earnings) is central to South African households' economic status. About a quarter of households receive no income from work, and the overall income per capita in these households is far lower than that of households that do receive some work income. Considering that the category of households receiving no income from work also includes wealthy white households whose members are retired, the low relative income of households receiving no work income is even starker. Table 2 below compares some pertinent descriptive statistics of households according to whether or not they receive any income from work.

Table 2: Comparison between households receiving any and no income from work

	Household receives income from work	Household receives no income from work
% of households	73%	26%
% of individuals	72.5%	27.5%
Mean income per capita	R5 836.31	R2 861.88
Median income per capita	R24 820.13	R7 863.67
Head of household African (%)	74.8%	91.7%
Head of household female (%)	35.9%	63.3%

We decompose total income inequality by factor source in order to determine the extent to which earnings inequality contributes to total income inequality. Data is sourced from the 2005

Income and Expenditure Survey (IES)[7]. The method follows Shorrocks (1982a) and Jenkins (1995).

Define:

μ as the mean income of the population;

σ^2 as the variance of income;

y_i as the income of individual i for $i = 1,2, \ldots n$;

y_{if} as the income of individual i from source f where $f = 1,2,\ldots F$, here $F=6$;

such that $\sum_f y_{if} = y_i$;

μ_f as the mean of income source f;

σ_f^2 as the variance of income source f.

Then:

$\phi_f \equiv \dfrac{\mu_f}{\mu}$ is the share of source f in total income;

C_f is the covariance between source f and total income;

ρ_f is the coefficient of correlation between source f and total income.

And:

I_2 is the GE(2) measure of inequality, the squared coefficient of variation;

I_{2f} is the GE(2) measure of inequality for source f;

S_f as the absolute contribution of source f to total inequality,

such that $I_2 = \sum_f S_f$.

Then:

$$s_f \equiv \frac{S_f}{I_2} = \frac{\rho_f\, \phi_f\, \sqrt{\dfrac{I_{2f}}{I_2}}}{I_2}$$ is the proportionate contribution of source f to total

inequality. Thus source f has a disequalising impact on total inequality if $s_f > 0$, an equalising

impact if $s_f > 0$ and no impact on total inequality if $s_f = 0$.

The various income sources are grouped into the major categories shown in Table 3. The results are shown using three different methods of scaling household into per capita income (E_1-E_3), as set out in Appendix 2.

The key finding from the decomposition of income by factor source is the importance of income from work as the major driver of overall income inequality.[8] Income from work accounts for 78-79% of total income inequality. This is not surprising, given the dominance of significance of income from work as an income source. However, due to the particular distribution of income from work, it accounts for an even higher proportion of total income inequality than its actual share in total income.

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[8] This finding is consistent with previous studies using earlier South African data, although the magnitudes of the results vary somewhat. Leibbrandt et al (1996) decompose the Gini coefficient of African income in 1993 by factor source, finding that 82.4% of income inequality is accounted for by wage income and income from self-employment accounts for an additional 7.7%. Bhorat et al (1999) apply the same methodology to the 1995 Income and Expenditure Survey, finding that 66.6% of total income inequality can be attributed to wage income and a further 24.44% can be attributed to income from self-employment. Using the same 1995 dataset but an alternative decomposition of the Gini, the results of Leite et al (2006) indicate that 58.5% of the Gini is accounted for by wages and salaries, while five years later (using the 2000 Income and Expenditure Survey) this had apparently risen to 71.3%.

Table 3: Decomposition of income inequality by factor source

Equivalence scale	Share of income (%)			Contribution to total inequality (%)		
	E_1	E_2	E_3	E_1	E_2	E_3
Income from work	74.34	73.61	73.73	78.99	77.72	77.56
Income from capital	1.16	1.10	1.10	2.84	2.69	2.74
Pensions	2.62	2.37	2.37	1.23	1.05	1.06
Welfare grants	6.11	6.87	6.84	-0.00	-0.17	-0.16
Other income	6.27	6.65	6.54	8.95	11.08	11.06
Imputed rent	9.49	9.41	9.42	7.99	7.65	7.75
Total	100	100	100	100	100	100

Notes:

Inequality is measured in terms of GE(2), half of the squared coefficient of variation.

E_1-E_3 refer to three alternative equivalence scales used to convert household to per capita income; see Appendix 3 for further details. E_1 is simple household per capita scaling; E_2 converts children into adult equivalents and also takes account of economies of scale; and E_3 is based on the McClements equivalence scale and factors in the ages of children and economies of scale in a slightly more complex way.

Income from work includes salaries, wages, and income from self-employment.

Income from capital includes income from letting of fixed property; royalties; interest; and dividends.

Pension includes pensions from previous employment and investment annuities from own investment.

Welfare grants include old age pensions; disability grants; family and other allowances; and worker compensation funds.

Other income includes a range of income sources such as alimony, hobbies, stokvels, food and clothing received, vehicle and property sales, gambling, lobola (dowry), and tax refunds.

Imputed rent on own dwelling is calculated as 7% of the value of the dwelling per annum.

5. DECOMPOSING THE EFFECTS OF UNEMPLOYMENT AND EMPLOYMENT STRUCTURE ON EARNINGS INEQUALITY

We investigate the effects of unemployment as well as of other selected dimensions of labour market structure on earnings inequality. This is undertaken through the decomposition of earnings inequality by population subgroups, where the subgroups are various categories of the labour market. The decomposition methodology is set out below, followed by the presentation of the static and then dynamic decompositions of earnings inequality.

Data availability restricts this analysis to earnings inequality.[9] However, the importance of earnings inequality to income inequality established in the previous section suggests that this analysis has relevance to income inequality more broadly.

5.1 Static decomposition of earnings inequality

The use of decomposition analysis by population subgroups is well established in the field of inequality analysis. The intuition behind the decomposition of inequality by subgroups is to divide a population into discrete subgroups, with the partitioning on the basis of distinct and mutually exclusive personal or group characteristics, and to compute the inequality within and between each of these subgroups.

The 'between-groups' component is calculated across the entire population and shows the differences in the mean of earnings (or whichever variable is being calculated) between the groups. This basically indicates how much inequality there would be, were there no inequality within each subgroup, i.e. if every member of that group received the mean earnings of the group such that inequalities between groups were the only source of inequality. The 'within-groups' inequality is a weighted sum of the inequality within each of the subgroups, and shows how much inequality there would be if there was no inequality between the groups. These two components sum to total inequality.

We define:

μ as the mean earnings of the population (with the population as defined in each decomposition below);

y_i as the earnings of individual i for $i = 1, 2, \ldots n$.

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[9] Decomposing total income inequality by labour market categories would require detailed information on each person's income as well as labour market status. While the IES data used in the inequality decomposition by factor source (reported in section 4) provides detailed information on income, there are no questions dealing with labour market status of household members. On the other hand, there is no quantitative information in the LFS as to non-earnings sources of income. This precludes decomposing overall income inequality by labour market status.

We partition the population into subgroups based on labour market status (as set out below for the various decompositions), with:

N_k the subset of individuals in subgroup k;

n_k members of subgroup k;

μ_k as the mean earnings of subgroup k;

$v_k = \dfrac{n_k}{n}$ the proportion of the population in labour market subgroup k;

$\lambda_k = \dfrac{\mu_k}{\mu}$ the subgroup mean earnings relative to the aggregate population mean.

Inequality (measured by mean log deviation) is then decomposed as follows:

$$I_0 = \frac{1}{n}\sum_i \ln\left(\frac{\mu}{y_i}\right) = \overbrace{\sum_k v_k I_0^k}^{\substack{within-groups \\ component}} + \overbrace{\sum_k v_k \ln\left(\frac{1}{\lambda_k}\right)}^{\substack{between-groups \\ component}}.$$

In the initial analysis the two subgroups are the employed and the unemployed. The static decomposition of earnings inequality presented here indicates how much of earnings inequality can be accounted for by the fact that the employed receive earnings and the unemployed do not, and how much can be accounted for by inequality in earnings amongst the employed.[10]

Given the way that the decompositions are set up here, the within-groups component essentially measures the relative importance of inequality amongst the employed. The between-groups component basically measures how much of earnings inequality is explained by the difference between the mean earnings of those employed with the zero earnings[11] of those not working.

The results are shown in Table 4. The populations in the three decompositions shown here are the labour force (each of the official and expended definitions) and the working age adult population (between the ages of 19 and 65 inclusive). For the labour force, the two groups are the employed and the unemployed; while in the analysis of working age adults the two groups

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[10] All static decompositions of inequality are based on the September 2007 LFS.

[11] Actually, the imputed earnings of R0.01 per month for computational purposes.

are those working and those not working (i.e. including both the unemployed and those outside of the labour force) between aged 19 and 65 inclusive.

The between- and within-groups components of inequality are converted to a percentage basis for ease of interpretation. That is, the between-groups figure is shown as $\dfrac{100\sum_{k} v_k \ln\left(\dfrac{1}{\lambda_k}\right)}{I_0}$ indicating how much of earnings inequality is explained by inequality between the employed and the unemployed; while the within-groups figure $\dfrac{100\sum_{k} v_k I_0^k}{I_0}$ shows how much of total inequality is explained by inequality amongst the employed.

Table 4: Static decomposition of current earnings inequality by employment status (%)

	Between-groups	Within-groups	Total
Labour force – official definition	67.59	32.41	100
Labour force – expanded definition	79.44	20.56	100
Working age adults	87.62	12.38	100

A key finding from this part of the analysis is the importance of between-group inequality in accounting for earnings inequality (among the labour force or among the working age population). As would be expected, the relative importance of between-group inequality rises as the population being analysed expands, since the proportion of non-earners within the sample increases. The contribution of earnings inequality within the employed to broader earnings inequality – shown here by the within-groups component – ranges between 12% for the working-age adult population and 32% for the labour force (as officially defined). This contribution is driven by the fact that approximately 10% of the 'employed' earn nothing, by the prevalence of the 'working poor', and by the high degree of earnings inequality amongst the employed more broadly.

Next, we subdivide those working into two categories: those employed in the formal sector, and those employed in the informal sector (including domestic workers).[12] This investigates the impact of not only the rate of unemployment but also of this aspect of employment structure on earnings inequality.

To contextualise the decomposition analysis that follows, table 5 below compares the distribution of earnings in the formal and informal sectors as well as the unemployed. 90% of earnings go to people employed in the formal sector. Surprisingly, inequality of earnings is roughly similar between the formal and informal sectors.[13]

Table 5: Descriptive statistics of current earnings inequality by labour market status

	Formally employed	Informally employed	Unemployed
Population share	56.3%	20.6%	23.1%
Earnings share	90.9%	9.1%	0%
Gini	0.59	0.57	0
Mean log deviation	1.49	1.56	0

Earnings inequality is decomposed according to labour market status with the groups being the formally employed, the informally employed, and the unemployed or not working; the results are summarised in table 6. The between-groups component is found to be more important here in accounting for overall earnings inequality than in the previous decompositions (where all the employed were treated as a single group), as would be expected given the higher level of disaggregation used here. This is probably because the levels of inequality are similar within

[12] The categorisation of the formal and informal sectors used in this analysis is based on the definitions used by Stats SA. The allocation of LFS respondents to the formal or informal sector is based on their own response as to whether their employer is in the formal or informal sector. The explanation/prompting provided in the LFS questionnaire specifies that 'formal sector employment is where the employer (institution, business or private individual) is registered perform the activity. Informal sector employment is where the employer is not registered.' (Statistics South Africa 2008b).

[13] Earnings inequality measured by the Gini coefficient and by mean log deviation; it is also approximately equal between the formal and informal sectors when other measures of inequality are used.

each of the formal and informal sectors, but average earnings are significantly higher in the formal sector than the informal.

Table 6: Static decomposition of earnings inequality by labour market category

	Between-groups	Within-groups	Total
Labour force – official definition	70.77	29.23	100
Labour force – expanded definition	81.66	18.34	100
Working age adults	88.89	11.11	100

Note:

The groups in this decomposition are the formally employed, informally employed, and the unemployed in the cases where the reference population is the labour force; and the formally employed, informally employed, and those not working where the reference population is the working age adult population.

The level of wage dispersion within each of the formal and informal sectors does contribute to overall earnings inequality. But of greater importance are the gaps between the average earnings of the formal and informal sectors and between these and the zero earnings received by the unemployed. These findings might suggest that reducing the rate of unemployment, as well as closing the gap between formal and informal sector earnings or moving people from the informal to formal sectors, would be central to reducing the overall level of earnings inequality. Reducing earnings dispersion within each of the formal and informal sectors is of lesser importance in this regard.

5.2 Dynamic decomposition of earnings inequality

We use a dynamic decomposition methodology to analyse the changes in earnings inequality between 2001 and 2007, in order to explain how much of these changes can be accounted for by changes in the various aspects of labour market structure. That is, we seek to identify how much of the changes in earnings inequality can be accounted for by changes in factors such as unemployment, earnings dispersion amongst the employed, and differences in earnings between the formal and informal sectors.

In the dynamic decomposition we follow the method pioneered by Mookherjee and Shorrocks (1982) for the analysis of trends in income inequality in the UK. Following on from

the method for the static decomposition of inequality set out in the previous section, further define:

$$\bar{v}_k = \frac{1}{2}\left(v_k^t + v_k^{t+1}\right) \text{ for time periods t and t+1.}$$

Similarly for $\bar{I}_0^k$ and $\overline{\log \lambda_k}$.

Then the change in the mean log deviation measure of inequality can be decomposed as follows:

$$\Delta I_o \approx \underbrace{\sum_k \bar{v}_k \Delta I_0^k}_{\substack{\text{change in} \\ \text{subgroup inequality}}} + \underbrace{\sum_k \bar{I}_0^k \Delta v_k}_{\substack{\text{effect on} \\ \text{within-group inequality}}} + \underbrace{\sum_k (\bar{\lambda}_k - \overline{\log \lambda_k})\Delta v_k}_{\substack{\text{effect on} \\ \text{between-group inequality}}} + \underbrace{\sum_k (\bar{\theta}_k - \bar{v}_k)\Delta \log \mu_k}_{\text{change in relative income of subgroups}}$$

As with the static decompositions of inequality for 2007 set out in the previous section, we begin with a simple decomposition of inequality into just two groups: the employed and the unemployed.

We show the decomposition of changes in two periods: the episode in which both unemployment and inequality were increasing (first half of 2001 to second half of 2002) and the episode in which both were falling (the second half of 2002 to the second half of 2007). Applying the decomposition to these two periods separately avoids the high degree of volatility between individual years or between the biannual surveys, while also picking up the potentially different dynamics of these two distinct periods rather than mixing them together.[14]

The results are shown in Tables 7 and 8 (using the official and expanded definitions of unemployment respectively), in percentage form. That is, the effect of changes in earnings inequality is shown as $\dfrac{100\sum_k \bar{v}_k \Delta I_0^k}{\Delta I_o}$; the effect of changes in the rate of unemployment[15] is

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[14] Period 1 in particular is unfortunately shorter than would be desirable, but this is limited by data availability.

[15] In general, this would be the effect of changes in the proportions employed and unemployed, which amounts to the unemployment rate since the population here is the labour force.

shown as $\dfrac{100\left(\sum\limits_{k}\bar{I}_0^k\,\Delta\nu_k \;+\; \sum\limits_{k}(\bar{\lambda}_k - \overline{\log\lambda_k})\Delta\nu_k\right)}{\Delta I_o}$; and the effect of changes in between-group

inequality (i.e. the relative income of subgroups) as $\dfrac{100\sum\limits_{k}(\bar{\theta}_k - \bar{\nu}_k)\Delta\log\mu_k}{\Delta I_o}$. The components

sum to 100% in the first period and -100% in the second period, since inequality rose in the first period and fell in the second.

The most important result arising from this analysis is the importance of changes in the unemployment rate in explaining changes in earnings inequality within the labour force. During the first period, in which both unemployment and inequality rose, increases in the unemployment rate accounted for just over 72% of the increase in earnings inequality within the labour force. Both unemployment and inequality fell during the second period, and the decrease in the unemployment rate similarly explained just under 72% of the decrease in inequality. This finding highlights the huge importance of the unemployment rate in explaining earnings inequality.

Inequality amongst earners contributed to a small extent to the increase in inequality amongst the entire labour force in the first period, and to a somewhat larger extent to the decrease in inequality in the second. It is interesting that inequality amongst earners moved in the same direction as trends in overall labour force inequality as well as in the unemployment rate, in both periods.

The third component of the decomposition is changes in between-group inequality, that is, the effect of the change in relative mean earnings of the employed and unemployed on changes in overall earnings inequality of the labour force and is essentially a residual factor in this decomposition. This is the only component with the same sign in the two periods, meaning that it contributed to the rise in inequality in the first period and mitigated the fall in inequality in the second period.

Table 7: Periodised results from dynamic decomposition of earnings inequality by employment/unemployment [official definition] (%)

	Period 1 (2001-1 - 2002-2)	Period 2 (2002-2 - 2007-2)
Effect of changes in earnings inequality	14.6	-35.8
Effect of changes in unemployment rate	72.1	-71.8
Effect of changes in between-group inequality	13.2	7.7
Total	100	-100

Table 8: Periodised results from dynamic decomposition of earnings inequality by employment/unemployment [expanded definition] (%)

	Period 1 (2001-1 - 2002-2)	Period 2 (2002-2 - 2007-2)
Effect of changes in earnings inequality	11.0	-40.0
Effect of changes in unemployment rate	72.6	-74.9
Effect of changes in between-group inequality	16.4	14.9
Total	100	-100

As with the static decomposition, we extend this analysis by subdividing the employed into those working in the formal sector and those working in the informal sector. The changes in labour force earnings inequality between 2001 and 2007 are decomposed according to three subgroups: the formally employed, the informally employed, and the unemployed.

These results, summarised in Tables 9 and 10, reinforce those from the dynamic decomposition into employed and unemployed discussed above. The most important factor explaining both the increase in inequality in the first period and the fall in inequality in the second, is changes in labour force structure in terms of the proportions of the labour force that are employed in the formal sector, employed in the informal sector, and unemployed respectively.

Table 9: Periodised results from dynamic decomposition of earnings inequality by formal employment/informal employment/unemployment [official definition]

	Period 1 (2001-1 - 2002-2)	Period 2 (2002-2 - 2007-2)
Effect of changes in earnings inequality	21.5	-31.7
Effect of changes in proportions formally employed / informally employed / unemployed	62.5	-71.1
Effect of changes in between-group inequality	15.9	2.8
Total	100	-100

Table 10: Periodised results from dynamic decomposition of earnings inequality by formal employment/informal employment/unemployment [expanded definition]

	Period 1 (2001-1 - 2002-2)	Period 2 (2002-2 - 2007-2)
Effect of changes in earnings inequality	16.3	-35.3
Effect of changes in proportions formally employed / informally employed / unemployed	67.5	-73.6
Effect of changes in between-group inequality	16.2	8.9
Total	100	-100

6. DISCUSSION

Our empirical investigation points to the centrality of unemployment to the understanding of inequality in South Africa. The decomposition of overall income inequality by factor source showed that earnings from work account for most of total income, and the inequality in households' receipt of earnings from work account for almost 80% of overall income inequality.

We also observe a surprisingly close relationship between the trends in unemployment and in earnings inequality amongst the employed over time. This is interesting in that it suggests that – at least for the period under review and within the ranges of inequality and unemployment during that period – there might not be a trade-off between inequality and unemployment, as the dominant international literature would expect.

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The relevance of unemployment to inequality is underscored by the results from the static and dynamic decomposition analyses of earnings inequality. The rate of unemployment was found to account for the bulk of earnings inequality. Further, changes in unemployment account for most of the changes in inequality, both during the rise in inequality up to late 2002 and during the subsequent decline.

These results could suggest that rather than there being a trade-off between reducing unemployment and reducing inequality, similar policies might be able to address both of these. Furthermore, addressing the crisis of unemployment is vital if South Africa's extremely high levels of inequality are to be reduced. A shift in the growth path in which the relative and absolute demand for unskilled and semi-skilled labour increased could bring down both unemployment and inequality.

Of course, the finding of the relationship between unemployment and inequality – and the implication that there is not necessarily a trade-off in addressing these – might not necessarily hold for values of unemployment and inequality outside of the range analysed here with the data which is available. That is, there may indeed be a trade-off between unemployment and inequality at lower levels of inequality and/or unemployment.

Earnings dispersion amongst the employed as well as the proportions of people in the formal and informal sectors, are also important albeit lesser contributors to inequality among the labour force and among working age adults. Having established the centrality of addressing unemployment in order to address inequality, we also cannot say that just 'any jobs' would really be a solution to the problem of high levels of inequality in South Africa, even if these jobs are very badly paid. An increase in the dispersion of earnings amongst the employed, or an informalisation of employment, would tend to worsen inequality. A massive expansion of decent employment opportunities, particularly for the low-skilled and semi-skilled, could be the most important means of bringing down overall inequality in South Africa.

Dramatic improvements in distribution rarely come about without active measures targeted specifically at lessening inequality. Moderate decreases in inequality may well come about as a by-product of other dynamics. However, the magnitude of the reduction in inequality that would

be required to bring South Africa anywhere in line with international norms is not going to happen without policies dedicated to that end.

The most important dynamic underlying future distributional changes is likely to be through the labour market, in terms of both employment creation (or losses) and the distribution of earnings amongst the employed. It is improbable whether South Africa's inequality could be brought down to 'decent' levels – at least to 'normal' standards of inequality internationally – without increased demand for low- and semi-skilled labour, as well as through a closing of wage gaps.

Appendix 1: Processing of LFS data

The empirical analysis of earnings inequality was undertaken using the fourteen full datasets of the Labour Force Survey (LFS), February 2001–September 2007. The LFS is conducted biannually by Statistics South Africa through visits to households, and observations are then weighted (using weights derived from the census) to obtain national figures. South Africa's official labour market statistics are derived from the LFS.[16]

Below we summarise some of the elements of the processing of the original LFS datasets that was implemented in advance of the quantitative analysis.

Screening of high incomes

Analyses of income distribution are sensitive to very high incomes. However, it is well known that incomes at the top end of the distribution tend to be disproportionately underreported in surveys, and hence it is likely that high-end incomes are actually underestimated. Nevertheless, high earnings were screened for observations which seemed clearly erroneous. 15 original observations, which would have been weighted to 7 438 cases, were excluded on the grounds of their unrealistically high reported earnings, particularly in the light of the occupations and other personal characteristics of the respondents.

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[16] For this study, the original datasets were accessed through the South African Data Archive of the National Research Foundation.

Treatment of zero incomes

At the other end of the distribution spectrum, about 10% of respondents who are classified as employed report zero earnings. These are not people who declined to report their earnings (which is also an option in the questionnaire) but people who specifically reported zero earnings.

To some extent this is likely to derive from the expansive definition of employment used by Stats SA. A person need only have 'worked' for an hour in the previous week to be classified as employed. Further, this 'work' includes activities such as helping unpaid in a household business of any kind; doing any work on the household's land or looking after animals; doing any construction or major repair work on their home, plot, cattle post or business; or catching animals for household food. Counting such activities as employment clearly means that some people who are classified as employed will have zero earnings. Further, there is a significant proportion of people earning positive incomes not much higher than zero.

There are still likely to be a number of earnings that are erroneously reported as zero. However, there is no reliable way to discern which these would be. To simply delete everyone reporting zero earnings, as some studies on distribution in South Africa have done, would be to introduce a huge bias into the distribution by essentially cutting off the bottom end of the distribution.

We have thus left all reported zero earnings in the sample, although have computed certain measures with and without these observations for comparison purposes. Certain of the measures and decompositions of inequality used cannot be computed with zero incomes, and for those purposes we imputed nominal earnings of R0.01 per month where zero earnings were reported. This does not affect the measures of distribution at the decimal places reported here.

Treatment of earnings reported in brackets

While respondents were asked to state their actual earnings, those unwilling or unable to do so were also given the option of indicating which of fourteen brackets their income falls within. This poses a problem for computations requiring income as a continuous variable.

In a number of South African studies this was addressed through imputing the midpoint of the bracket to those in that bracket. However, a limitation of this approach is that the midpoint is

an inaccurate indicator of incomes in any given bracket, and for high brackets in particular is likely to underestimate the incomes of the bracket. Incomes in the highest bracket (R30 000 upwards per month) have in other studies been simply assigned the bottom floor of the bracket, which clearly leads to an underestimation of those incomes. We took an alternative approach to the imputation of incomes to bracket respondents, calculating the mean and median incomes of people who reported actual incomes, by bracket, for each year. These were then assigned to the people in the same bracket who simply identified a bracket.

This yielded two alternative measures. In the measure utilising mean incomes, the addition of the bracket-reporters with their imputed income obviously does not affect the mean income within each bracket, but it does affect the number and distribution of people within each bracket (and overall income distribution measures). In the measure utilising median incomes, the bracket median does not change but the mean does change somewhat, once those respondents who reported their incomes in brackets are added in. The empirical analysis was undertaken using both, to ensure the robustness of the results. The measure using the mean bracket incomes generally yields slightly indicators of inequality than does the measure using medians.

Appendix 2: Equivalence scaling

Three alternative equivalence methods of scaling household income and expenditure into per capita equivalents are used here.

The simplest method is simply to divide the household total by the number of members of the household, referred to here as E_1 scaling. This is the method using by Stats SA. In this equivalence scaling,

$E_1 = s$ where s is the number of members of the household.

This method assumes there are no economies of scale in household costs, and it also takes no account of the varying costs for different types of household members (such as an infant or adult). These limitations are addressed in the other two methods used here.

In what we term E_2 scaling,

$E_2 = (s_A + \eta s_K)^{\theta}$ where:

s_A is the number of adults in the household and s_K is the number of children;

η is the adult equivalent of a child; and

θ is the scaling factor for household economies of scale.

Thus $E_1 = E_2$ for $\eta = 1$ and $\theta = 1$.

The parameters which we use are $\eta = 0.5$ and $\theta = 0.9$. These are in line with those used in the international literature, as well as those used in the South African context (see for example Woolard and Leibbrandt 2006).

The third equivalence scaling used is the McClements equivalence scale, referred to here as E_3. This takes account not only of how many adults and children there are in the household, but also the ages of the children. The parameters of the scaling used here are adapted from Lambert (2001) and in line with those used internationally. A limitation in this respect is that they are not based on empirical evidence of the costs faced by different age categories in the specific South African context, as there is no suitable existing evidence in this regard.

The household scaling factor is calculated under this scale as follows:

$E_3 = \sum_i^s \lambda_i$ for all s members of the household, where:

$\lambda_i = 0.61$ for the first adult (where 'adult' is aged 20 years or over);

$\lambda_i = 0.39$ for the second adult;

$\lambda_i = 0.46$ for the third adult;

$\lambda_i = 0.36$ for subsequent adults;

$\lambda_i = 0.135$ for each member aged 0-4 years;

$\lambda_i = 0.22$ for each member aged 5-9 years;

$\lambda_i = 0.25$ for each member aged 10-14 years;

$\lambda_i = 0.35$ for each member aged 15-19 years; and

$\lambda_i = 0.3858$ for each member that did not report their age.

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