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Measuring Trends in Urban Inequality and Poverty in the Copperbelt, Zambia

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Abstract This article is a discussion of how to measure urban inequality using the results of large household samples. It has two aims. The first is to de-mystify the methods of measuring earnings inequality by discussing their logic and their results in plain language that is suitable for a non-specialist audience. The second is to persuade the reader that such surveys can be suitable for measuring income derived from all kinds of livelihood strategies, including informal sector activities. The results show persistently high levels of inequality over time among income earners on the Copperbelt. Disaggregation of the employed workforce by major occupational groups reveals increasingly more elementary and middle-income workers than higher income managers, professionals, and technicians. This pattern differs by gender, however, with only women experiencing a marked increase in low-skill, low-wage employment.

Introduction

This work forms part of the Consuming Urban Poverty (CUP) project, which seeks to contribute to the debates around urbanisation and urban poverty in sub-Saharan Africa (SSA). Major/capital cities in the region have been extensively studied but there is a knowledge gap regarding smaller urban areas. These areas are being recognised as increasingly important sites of urbanisation in SSA. Thus, this project is mainly concerned with secondary cities in SSA. The knowledge gaps about these places are in part attributable to researchers not utilising formal data sources to study them. Lack of smaller scale data does hinder some forms of investigation. However, the widespread

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belief that informality renders the African context too unique to study using conventional data sources and methods also plays a role. It is in this context that we turned our attention to the urban areas of the Copperbelt Province of Zambia. Most of Zambia's economic activity is concentrated along the old rail line in the highly urbanised Copperbelt and Lusaka (De La Fuente et al. 2015). In these areas, poverty levels are greatly influenced by the availability of wage employment—much more so than in rural areas where households are mostly engaged in subsistence agriculture. In self-assessments of the reasons for their poverty, the reasons most commonly cited by poor urban households in 2010 were low wages/salaries (25.2%) and a dearth of employment opportunities (17.8%). Unsurprisingly, wage earning household heads in urban areas of Zambia experienced the least poverty (15%), while the unemployed and unpaid workers experience some of the highest levels of poverty (46% and 59%, respectively) (CSO 2012b).

In preparing our analysis of inequality and poverty in the Copperbelt, we were obliged to read the literature on methods of measuring inequality and we were struck by the inaccessible style of all the writing. They were clearly written for an expert audience and made many assumptions that were not made clear to the reader. We therefore thought that it would be a useful contribution to this issue if we discussed these methods in plain language for a non-specialist audience. The first aim of this article is to therefore discuss these methods and their results in an accessible style that will enable non-specialists to understand their utility and to interpret their results. Our second aim is to make the case that conventional data sources such as household surveys can be used to measure all economic activities, including informal sector livelihoods. These topics are dealt with in more detail in the following discussion.

Household Surveys, Inequality, and the Informal Sector

One of the primary reasons for the usefulness and importance of conceptualising livelihoods in terms of informal sector activities is the belief that such activities are often overlooked by economists, who tend to focus on employment in the formal sector and tend to ignore the many kinds of economic activities carried out by self-employed workers in the informal sector (Hart 1973). In his seminal article, Hart went even further to say that informal sector activities were not only overlooked by policymakers but that they also "escape enumeration" by surveys designed to measure economic activity (Hart 1973: p. 68). Even today, scholars argue that "[t]he informal sector as a whole is often underenumerated" (Chen et al. 1999: p. 605). It is certainly true to argue that if questionnaire surveys are not designed to measure informal sector activities, they will underestimate the size of such activities. However, this is not the case with these national surveys. The Zambian surveys were designed to measure all kinds of work activities in terms of both the sample design and the design of the questionnaire.

In terms of the sample design, these Zambian surveys are samples of households and not business enterprises. Thus, they do not run afoul of the criticism that they measure livelihoods only at formal business establishments. Furthermore, although the household is the unit of selection, the work details of every single household member of working age are recorded. Finally, the samples are very large probability samples, with national sample sizes of individuals ranging from about 44,000 to 57,000 in the case of the Priority Surveys and of about 59,000 in the case of the Labour Force Surveys. The

population censuses are obviously full counts but researchers are provided with files containing only a 10% sample of the full count. Nonetheless, these samples are very large, ranging from about 787,000 in the case of the 1990 Population Census to 1,300,000 in the case of the 2010 Population Census. These national sample sizes translate into samples of the Copperbelt Province of roughly 3000 to 30,000 individuals. These are still large sample sizes, which allow researchers to make fairly precise and reliable statistical estimates of work activities for the urban areas of the Copperbelt Province of Zambia.

As far as the questionnaire design is concerned, the Priority Surveys, which were conducted in 1991 and 1993, recorded any work that was carried out by the respondent (aged 7 years and older) during the year before the interview. This included any work done for pay, profit, or family gain, even by schoolchildren in their school holidays and unpaid family members. To ensure that all kinds of informal work were recorded, the questionnaire included work activities such as self-employed "hawkers," "street vendors," and "ngwangazis" (who call out the destinations at bus stations). Also included are subsistence farmers and fishing, hunting, and forestry activities such as mushroom gathering (CSO 1991: p. 20; CSO 1993: p. 21–22). Similarly, the Labour Force Surveys, carried out between 2005 and 2014, recorded any "work activity" that was carried out by the respondent (aged 15 years and older) during the week before the interview, even if the activity was carried out for only 1 hour. To ensure that all activities were included, the respondent was counted as employed if they had been self-employed in activities such as collecting firewood, home construction or repair, fishing, hunting and raising animals, or growing crops (CSO 2012a; 2012b: p.6; CSO 2015: p. 101). Finally, the 2010 Population Census included all household members (aged 12 years and older) as employed if they were not full-time students, homemakers, pensioners, or not able or willing to work (CSO 2010: p. 35). Respondents were counted as employed if they did any work for pay, profit, or "family gain" for at least 1 day in the preceding week. This included farming, fishing, hunting, and forestry activities such as collecting wood, honey, mushrooms, and wild fruit for sale or consumption (CSO 2010: p. 35). In conclusion, it is therefore clear that these surveys were not designed to measure only formal sector economic activities. The design of the samples and the questionnaires demonstrates that they aimed to measure all kinds of economic activities, both formal and informal.

Urban Income Poverty and Inequality

This focus on urban income poverty and inequality is an appropriate, if somewhat belated response to the dramatic growth of the urban population in Africa. Today, the urbanisation rate on the African continent is over 40% and growing fast. By 2050, the urbanisation rate is expected to cross the 50% threshold (Parnell and Pieterse 2014). This urbanisation revolution has been met with a new policy approach that has been termed "the first truly global urban paradigm" (UN-Habitat 2015). This new policy approach to prioritise the development of cities took a concrete form when the General Assembly of the United Nations recently affirmed that cities should receive a dedicated Sustainable Development Goal that commits the world to "make cities and human settlements inclusive, safe, resilient, and sustainable" (Parnell et al. 2015; UN 2015; UN-Habitat 2015).

Scholars who contribute to the debate about urban income inequality conceptualise and measure inequality in many different ways. Unsurprisingly, these different methods of measuring inequality produce very different kinds of statistical results with very different meanings for inequality. What is surprising is that there is very little discussion that explicitly debates these different methods and why they are useful for different kinds of questions about the character of inequality. With some notable exceptions, it is quite common for different scholars to use the term "inequality" to refer to completely different measurements of inequality. As a result, the concept of inequality has come to mean a number of very different phenomena, with some confusion about what these phenomena are. Furthermore, since different concepts of inequality entail different measurements, it is quite possible that one type of measurement can demonstrate increasing inequality while another measurement shows declining inequality. We therefore need to understand that inequality is not a self-defining concept, in the sense that it is not a phenomenon that exists in the world, just waiting for us to see it for what it is and to measure it accordingly. To think in these terms is to accept positivist assumptions about the nature of social reality and how we can know it. Instead, we need to understand that inequality is a concept-laden measurement of phenomena in the real world. Depending on precisely how we conceptualise inequality, so our measurements will produce different kinds of results with different insights into social inequality as it exists in the real world.

In the following discussion, measurements of earnings inequality in the Copperbelt are presented from 1990 to 2014. These data measure income, or more precisely, earnings from employment and self-employment, which includes all informal sector activities. They do not measure income from investments in stocks and property. Also, they measure pre-tax income, which means that they will overestimate inequality since high-income earners will earn less, after tax, than is reported by these surveys. The data sources are the Priority Surveys (1991 and 1993), the Population Censuses (1990 and 2010), and the Labour Force Surveys (2008, 2012, and 2014). This analysis includes all full-time and part-time employees and self-employed persons in both the formal and informal sectors.

The Copperbelt

The towns in the Zambian Copperbelt had their origins in the discovery of copper ore. Copper mining began in the late 1920s and by the time of independence from colonial rule in 1964, the national urban population had grown to one million people or 30% of the total population (Ferguson 1999: p. 1). This steady progress towards industrialisation and urbanisation was brought to an end by the decline in the price of copper from the mid-1970s. On the Copperbelt, mining production halved by 1995 and several mines had closed altogether (Ferguson 1999: p. 7). These early changes in the terms of trade were accompanied by the nationalisation of the mines. So, when the demand for copper fell, the state borrowed heavily to keep the mines going. The result was not only economic decline for the state-owned mining companies but also a severe national debt crisis that lasted for 30 years. Furthermore, the decline of mining output resulted in the economic decline of the manufacturing sector (Hampwaye and Rogerson 2010: p. 391) Among the consequences was the reduction in the number of jobs and a decline in wages in the towns of the Copperbelt (Fraser 2010: pp. 9–10). The price of

copper recovered in 2004, but this did not lead to a return to the prosperity of the 1960s. Although mining production increased (Chitonge 2016: p. 2) and the number of jobs increased, unemployment nonetheless remained high (Fraser 2010: p. 14). An important consequence of this low economic growth was the slight de-urbanisation of the Copperbelt as urbanites left towns to live in rural districts (Potts 2005: p. 591).

Earnings Inequality in the Copperbelt

The most common method of measuring earnings inequality entails measuring the distribution of individual earnings in a population. In other words, the method is concerned to measure how much income poor people earn compared to how much income rich people earn. One of the difficulties of comparing income inequality in different populations, or in the same population at different points in history, is that the size of the population changes. Since it is impossible to meaningfully compare income distributions in populations of different sizes, it is necessary to standardise population size. To make comparisons across different populations, most measures of the distribution of income therefore standardise population size by using a technique that makes the distribution of income relative to the size of the population. In this way, the distributions of income in populations of vastly different sizes can be meaningfully compared.

This standardising technique entails classifying the population of individuals into "quantiles" according to their income. In effect, quantiles are simply equal-sized groups of individuals measured in percentage terms that add up to a total of 100%. For example, take the popularly known example of the "median" value of an income distribution. The median is the income value which divides the population of individuals into two equal halves. Specifically, 50% of the population have incomes higher than the median income and 50% of the population have incomes that are lower than the median income. This logic can be applied to other quantiles, such as deciles and quintiles. In the case of deciles, for example, the population of individuals is divided into ten equally sized groups according to their income.

Quantiles are used to create two kinds of measures of inequality and poverty. The first is the estimation of "cut-off" points in the income distribution. For example, if we divide a population into deciles according to individual incomes, we do so by establishing the exact income value, or cut-off, that separates one decile from another. The second kind of measure entails calculating the share of income earned by each decile of individuals. This measure allows us to compare the amount of all income that is earned by poor individuals with the amount of all income that is earned by rich individuals.

The 90/10 Decile Cut-off Ratio (the "Income Gap")

A popular way of measuring inequality is to calculate the difference (or "gap") in the incomes of the rich and the poor. This is usually done by calculating the difference between the absolute level of income at the 10th and 90th percentiles. These incomes are the cut-off points for the deciles of individuals with the lowest and highest incomes. In order to describe the inequality in a distribution with a single statistic, the cut-off incomes for the 10th and 90th percentiles are placed into a ratio with each other. This

allows for the meaningful comparison of changes in the income distribution of the same population over time or between different populations. If the difference between low incomes and high incomes increases, then the 90/10 decile ratio will increase. Similarly, if the income gap between poor and rich individuals decreases, the 90/10 decile ratio will also decrease. The usefulness of such a relative measure is that it is not influenced by the changing range of absolute incomes. In the urban studies literature, this decile ratio is also termed the income gap because it measures the difference between the earnings of the poor and the rich (Hamnett 2003: pp. 78–84).

If this method of measuring the income gap between the highest and lowest decile cut-offs is applied to the Copperbelt over the period from 1991 to 2014, the results show that the ratio has more than doubled from 9 in 1991 to 17 in 2014 (Fig. 1). So, the general trend has been one of a growing and persistent gap in the incomes between the poorest and richest earners in the Copperbelt.

One shortcoming of using the decile ratio to measure income inequality is that it is not sensitive to changes in the whole income distribution because it measures the incomes at only two points in the distribution (Jenkins 1991: p. 14). By contrast, measures such as the Lorenz curve and measures of polarisation describe the whole income distribution.

Income Share

The income share is a statistic that measures the relative amount of all income that is earned by a particular proportion of all earners. The proportion of all earners and the proportion of all income are expressed as percentages. This method was used recently by Piketty (2014) and his co-authors (Alvaredo et al. 2013) to show how the proportion
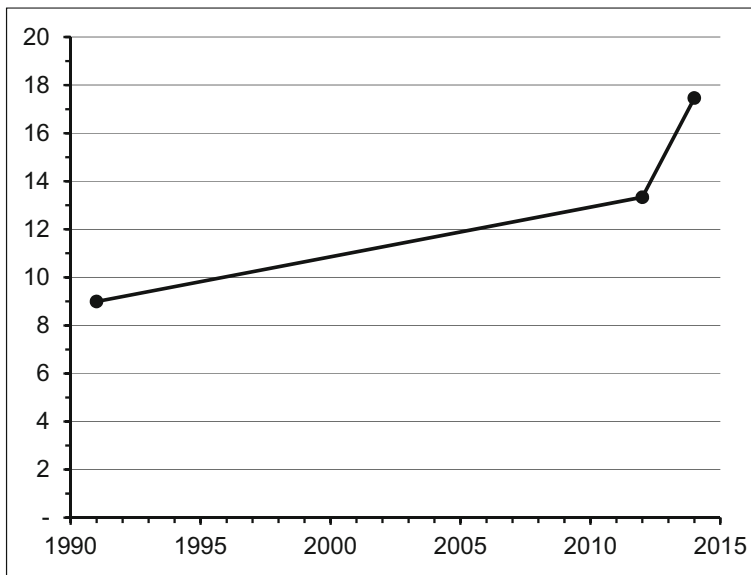

Fig. 1 The 90/10 decile cut-off ratio of earnings in the Copperbelt, 1991–2014 (sources: 1991 Priority Survey; 2012 and 2014 Labour Force Surveys)

of all income earned by the top 1% of earners has increased since the 1970s. The method entails ranking individuals according to their income. Then, the population of individuals is grouped into quantiles according to their income. The result allows us to calculate the relative amount of total income that is earned by each quantile of individuals. So, for example, we can calculate what percentage (or "share") of total income is earned by the richest decile of the population, or the richest percentile (1%) of the population. Since this method yields a single statistic for a population, it is usually used to measure changes in inequality over time. In this way, we can establish if the income share of the top decile of earners is increasing or decreasing. An increasing share of income among richer deciles and a declining share of all income among poorer deciles will both be evidence of increasing income inequality.

If we use the relative income share to measure inequality in the Copperbelt, the results show great, albeit declining, inequality. In 1991, the top decile of earners earned about 64% of all income and the bottom decile earned only 1% of all income (Fig. 2). Over the period 1991 to 2014, the income share of earners in the top decile declined to 37% of all income.

The Lorenz Curve

The Lorenz curve is also a measure that calculates the income share of earners. It is different from a simple income share calculation because it allows us to examine the changing share of income across the entire population and not for only one or two particular groups. The Lorenz curve also allows us to plot more than one curve on a
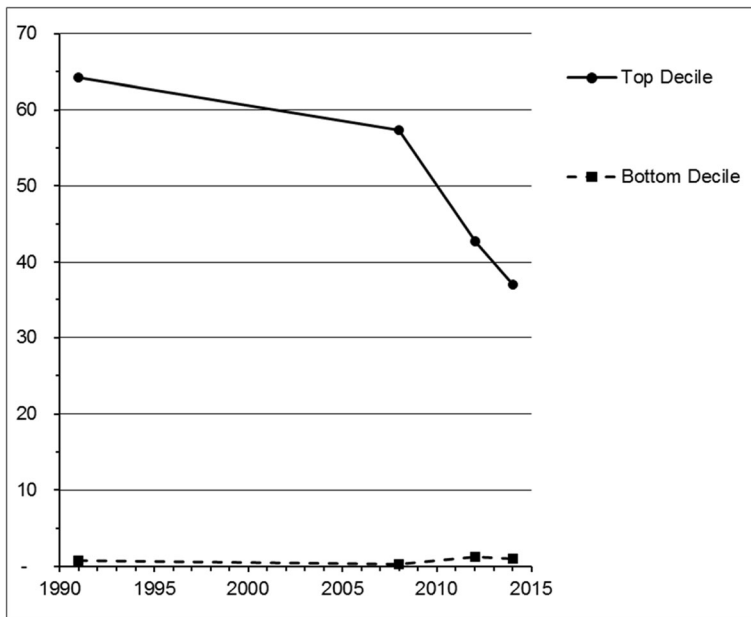

Fig. 2 Percentage income share of earners in the richest and poorest deciles, Copperbelt 1991–2014 (sources: 1991 Priority Survey; 2008, 2012, and 2014 Labour Force Surveys)

single graph, which is useful for comparing the inequality of two different populations or the same population at different points in time.

The Lorenz curve correlates the cumulative percentage distribution of individual incomes with the cumulative percentage distribution of the number of individuals. For example, if we use deciles to measure the distribution of income and individuals, the method plots the statistical relationship of the cumulative percentage of the number of individuals by income decile against the cumulative percentage of the amount of income earned by individuals in each decile (Cowell 2015: p. 105; Jenkins 1991: p. 12). The convention is to plot the cumulative percentage of all individuals (or, in our example, "earners") on the vertical axis and the cumulative percentage of all income on the horizontal axis. If each decile of individuals earns the same amount of income, then the curve that plots this relationship is a straight line (the "line of equality"). If there is inequality in the amount of income earned by individuals, then the curve falls below the straight line. The more unequal the distribution of income, the further the curve departs from the straight line (Blackwood and Lynch 1994: p. 574).

Applying this measure to the Copperbelt, the evidence shows that overall inequality has decreased between 1991 and 2014 (Fig. 3). The curve for 2014 is higher than the curve for 1991, indicating that the overall distribution of the income share was more equal in 2014 than in 1991.

The Gini Coefficient

The Gini coefficient is a summary statistic that describes the income distribution in a population. The Gini coefficient can range from "1," which represents maximum inequality to a value of "0," which represents perfect equality. A measure of maximum inequality would result from one individual earning all the income, while all other individuals earned no income. A measure of perfect equality would result from all
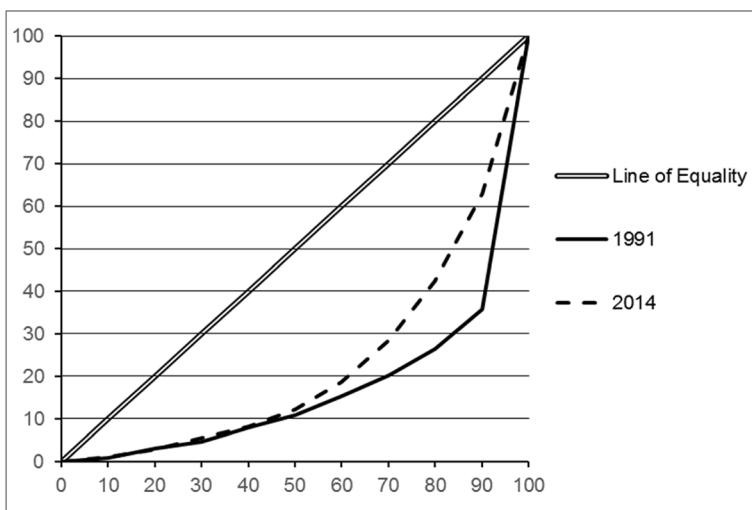

Fig. 3 Lorenz curves for the Copperbelt in 1991 and 2014 (sources: 1991 Priority Survey and 2014 Labour Force Survey)

individuals earning exactly the same income. The calculation of the Gini coefficient is based on the Lorenz curve: it is the ratio of the area that lies between the line of equality and the Lorenz curve, divided by the total area under the line of equality.

The Gini coefficient therefore provides us with a single measure of inequality that allows us to make comparisons of different populations or the same population over time. In the case of the Copperbelt, the Gini coefficient for the employed workforce increased slightly between 1991 and 2008 from 0.65 to 0.68. Thereafter, it decreased to 0.54 by 2014 (Fig. 4).

Income and Occupational Polarisation

By dividing up the population of individuals into standardised and equal-sized groups, the above relative measures of earnings inequality do something that is not made explicit in economics textbooks: they ignore the distribution of the absolute numbers of individuals in the measurement of earnings inequality (Esteban and Ray 1994: p. 821). The reason for this is simply that the method of dividing up the population into deciles is used to measure the changes in the share of earnings received by each decile of individuals. The absolute number of individuals in each decile therefore remains unknown because a decile is a relative measure. In order to measure the changing absolute number of individuals with different earnings, we need a totally different measure of earnings inequality, namely a measurement of "polarisation" (Duclos and Taptué 2015; Foster and Wolfson 2010).
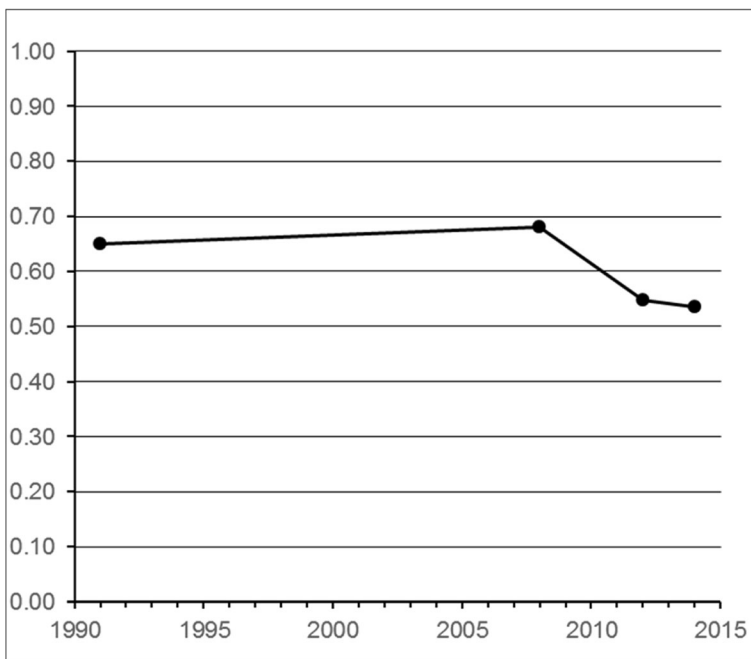

Fig. 4 The Gini coefficient for the Copperbelt, 1991 to 2014 (sources: 1991 Priority Survey; 2008, 2012, and 2014 Labour Force Surveys)

Measuring the polarisation of income entails measuring the change in the distribution of the number of individuals in the population according to their earnings. This approach is therefore concerned with the changing numbers of rich and the numbers of poor people in cities, which is quite different from measuring changes in the distribution of the amount of income earned by rich and poor people. Evidence for polarisation would therefore be demonstrated by large growth in the numbers of low-income and high-income earners and less growth in the number of middle-income earners.

This kind of measurement of changes in inequality is demonstrated in Fig. 5 below. The horizontal axis measures the distribution of earnings in terms of income deciles. The vertical axis measures the change in the number of earners within each of the income deciles. So, the bi-polar distribution of individuals shows that there is more employment growth at the extremes of the earnings distribution and less in the middle. Another way of putting this is that employment growth is distributed around two income modes. By contrast, a uni-modal distribution is one in which most employment growth is clustered around a single income mode. The important distinguishing feature of this measure of changing inequality is that it measures the distribution of the number (or frequency) of earners who fall into different income bands and how this distribution changes over time. This method therefore stands in contrast to measures of income share, which measure the distribution of the amount of income. Whereas the measurement of social polarisation effectively keeps the distribution of income a constant and measures the changing numbers of earners, the measurement of income share keeps the numbers of earners constant and measures the changing amount of income that they earn.

In the debates on urban inequality, polarisation is referred to as "social polarisation" (Borel-Saladin and Crankshaw 2009; Crankshaw and Borel-Saladin 2014; Crankshaw 2016; Hamnett 1994). When this kind of distribution of earners according to income is standardised as a percentage, economists call it a "density function." In other words,
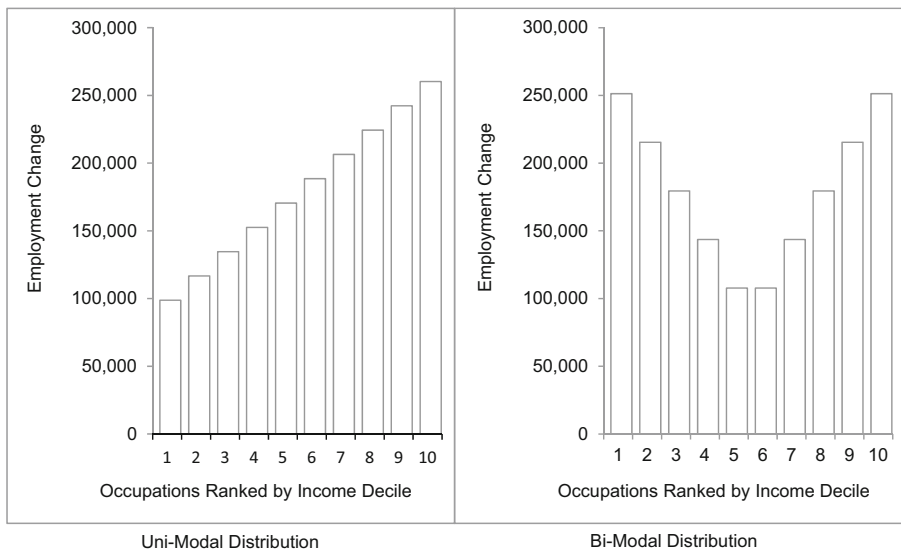

Fig. 5 Uni-modal and bi-modal distributions of employment change by income-ranked occupations

the density function of an income distribution can tell what percentage of individuals in a population earn within a given income range (Foster et al. 2013: p. 50).

In the social polarisation debate, scholars aim to measure the pattern of employment change over a specified period of time in order to establish if the numbers of workers at the high- and low-ends of the occupation and income distribution are growing more than the employment of those in the middle of the occupational and income distribution. The focus of this debate is on both the income and occupational distribution of employment because scholars argue that the changes in the income distribution are caused by changes in the occupational structure of employment. More specifically, the social polarisation hypothesis proposes that the polarisation of incomes is caused by the decline of employment in middle-income manual factory occupations and the growth of low-wage and high-wage service-sector occupations.

This hypothesis has been tested by calculating the average earnings of occupations and measuring the employment change in these occupations using two surveys separated by a long period of time. The method entails calculating the distribution of employment by occupations that are grouped into deciles according to their average income. The employment distribution is first calculated based on the survey conducted at the beginning of the period being studied. Then, the employment in these same occupational deciles is measured using the survey conducted at the end of the period under study. Note that the income-ranked occupational deciles are not calculated for the end of the period under study. This would produce the same amount of employment growth in each decile, since each decile would have 10% of each survey's employment. Instead, we first calculate the deciles based on the first survey at the beginning of the period under study. Then in the second survey, we measure the employment in the same occupations that were grouped into these deciles at the beginning of the period. In this way, we can establish the extent to which employment has changed in these occupations that were grouped into deciles in the first survey.

In Fig. 6 below, we can see that the pattern of employment change in Copperbelt towns between 1993 and 2010 is characterised by somewhat more employment growth in the higher-income occupations than in the lower-income occupations. The pattern of employment growth therefore follows a slightly professionalising pattern rather than a polarising one.

An alternative method for studying changes in the occupational and income structure entails the statistical analysis of employment trends by major occupational groups (Baum 1997; Borel-Saladin and Crankshaw 2009; Chiu and Lui 2004; Clark and McNicholas 1996; Crankshaw and Borel-Saladin 2014; Crankshaw 2016; Hamnett 2003). This method calculates the average incomes earned by workers in these occupational groups and then infers changes in the earnings and occupational distribution by measuring employment change by major groups of occupations. This method has the advantage of producing evidence of employment change that shows which occupational groups are causing changes in the earnings distribution. The disadvantage is that the occupational groups are large and contain a diverse range of occupations with a fairly wide range of earnings. By contrast, the first method discussed above, which analyses employment change by deciles of occupations ranked by earnings, does not provide us with information concerning the occupational groups that are causing these changes (Crankshaw 2016: pp. 2–3).
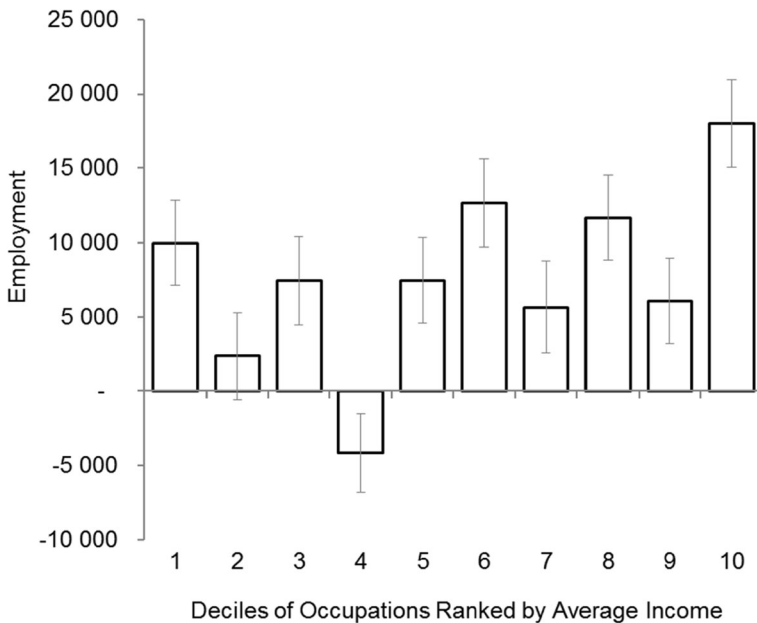
Fig. 6 Net growth in the distribution of employment, according to minor group occupations ranked by income, 1993 and 2010 (error bars indicate the 95% confidence intervals) (source: 1993 Priority Survey and 2010 Population Census)

The analysis of employment change by major groups of occupations is demonstrated in Fig. 7 below. The results of this kind of analysis show that there was much more employment growth in low-income elementary occupations and middle-income clerical support occupations and sales and service occupations than in high-income managerial, professional, and technical occupations. These results directly contradict the results of Fig. 6, which shows more employment growth in high-income occupations than in low-income occupations. This contradiction is caused by the earnings data in the 1993 Priority Survey, which records relatively high earnings among both skilled agricultural and fisheries workers and elementary workers, which is probably inaccurate, since these occupational groups are usually the lowest-paid groups. The employment growth in these two occupational groups therefore produced the growth in the top decile of Fig. 6. By contrast, the average incomes by major group occupation recorded by the 2014 Labour Force Survey are more credible (Table 1). They show that managers, professionals, and technicians are the high-earning occupations, and that the elementary and agricultural occupations are the low-earning occupations. The reason why we used the 1993 Priority Survey data instead of the 2014 Labour Force Survey to illustrate the method is simply because it was the only data source that included both earnings data and three-digit occupational descriptions.

The utility of using major group occupations becomes obvious when we need to compare groups in the workforce. It allows us to describe differences between groups in terms of occupational descriptions and earnings instead of solely by differences in earnings (Fig. 8). For example, comparing the occupational distributions of men and women, the results show that male employment is concentrated in the manual middle-
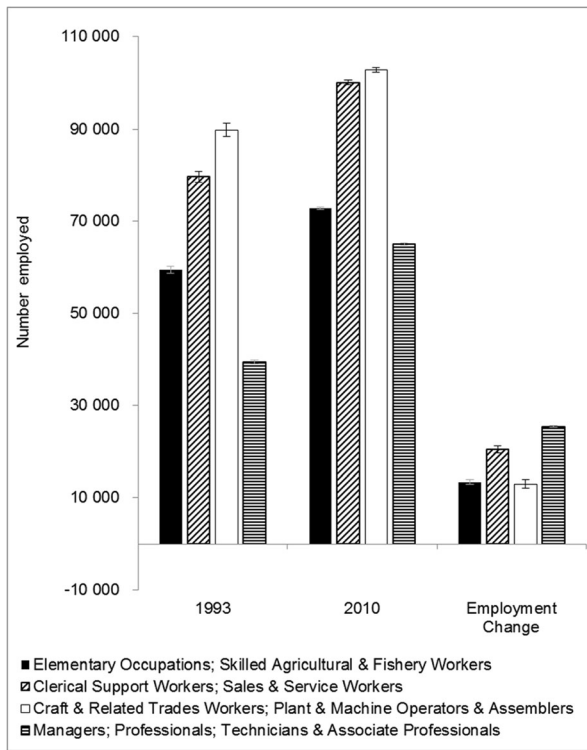
Fig. 7 Employment change by major group occupations, 1993 to 2010 (error bars indicate the 95% confidence intervals)

income occupations (Fig. 9) and that overall employment in these occupations has been much less than middle-income white-collar jobs and high-income managerial and professionals jobs over the period 1993 to 2010.

By contrast, women are concentrated in the middle-income white-collar clerical, service, and sales occupations (Fig. 8), in which there was substantially more overall employment growth (Fig. 7). So, this method allows scholars to measure the changing

Table 1 Average annual incomes by major group occupations (1993 and 2014 Kwachas)

| Major group occupations	1993 Priority Survey	2014 Labour Force Survey
Managers	ZMK 777,644	ZMK 1,075,591
Professionals	ZMK 666,831	ZMK 870,600
Technicians and associate professionals	ZMK 669,130	ZMK 669,704
Clerical support workers	ZMK 396,046	ZMK 431,057
Services and sales workers	ZMK 407,419	ZMK 225,552
Skilled agricultural, forestry, and fisheries workers	ZMK 295,585	ZMK 57,600
Craft and related trade workers	ZMK 501,554	ZMK 329,414
Plant and machine operators and assemblers	ZMK 529,575	ZMK 406,591
Elementary occupations	ZMK 360,929	ZMK 191,316
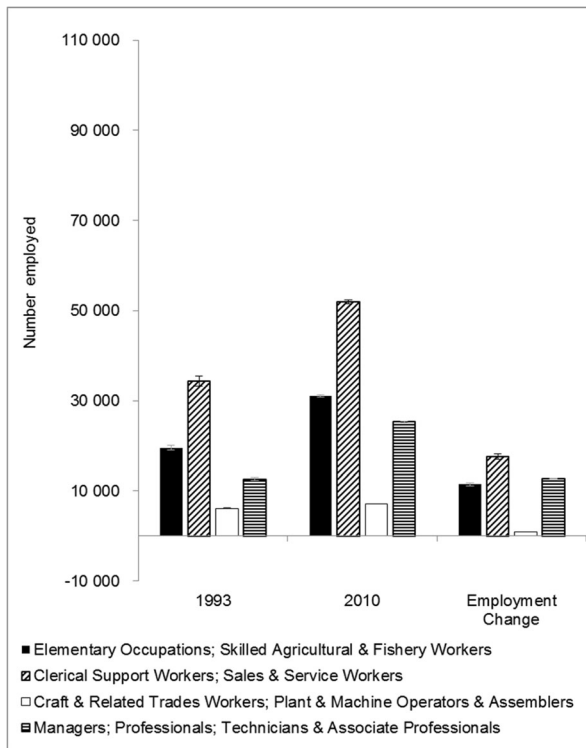
Fig. 8 Employment change among women by major group occupations, 1993 to 2010 (error bars indicate the 95% confidence intervals)

occupational composition of employment and its relationship to changes in earnings. In this particular example, this method shows important gender differences in the changes to the labour market, with implications for gender earnings inequality.

Poverty

Measures of poverty are really measures of a form of polarisation. A measure of poverty measures the absolute or relative size of the population that falls below a certain level of income, which is called the "poverty line." In other words, the poverty line measures the number or proportion of a population that earns below a certain level of income. It does not measure changes in the income distribution in the population. This becomes clearer when changes in the amount of poverty are measured. In the same way that polarisation is measured, we measure the increase or decrease in the size of the population at the low-income end of the distribution.

The poverty line can either be an absolute level of income or a relative level of income. An absolute poverty line is a fixed and absolute level of income that does not change when the whole income distribution changes. By contrast, the relative poverty line is a constant fraction of a measure of the income distribution (Leibbrandt and Woolard 1999). For example, the European Union has a poverty level that is 60% of the median income (Foster et al. 2013: p. 26).
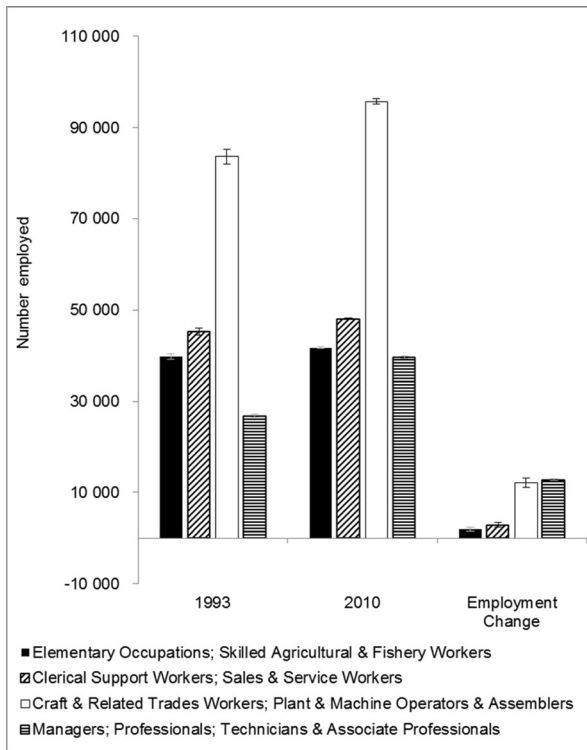
Fig. 9 Employment change among men by major group occupations, 1993 to 2010 (error bars indicate the 95% confidence intervals)

Conclusion

In this article, we have demonstrated how large-scale, formal survey data and well-established statistical methods can be used to study poverty and inequality in the smaller cities of the Copperbelt. The 90/10 cut-off ratio shows a growing and persistent gap in the incomes between the poorest and richest earners in the Copperbelt, i.e. a bigger income gap between rich and poor income earners. However, the relative income share, Lorenz curves, and Gini coefficients show declining inequality, i.e. a decrease in the share of all income among richer deciles and an increasing share of all income among poorer deciles. However, all these measures show that inequality levels are still very high. Analysis by major occupation groups reveals that the employed workforce is increasingly made up of more elementary and middle-income workers than higher income managers, professionals, and technicians. This pattern differs by gender however. Men and women have both experienced growth in higher- and middle-income jobs (mostly blue-collar jobs for men and sales and clerical work among women). Only women have shown a marked increase in low-skill, low-wage employment.

The importance of understanding these different measures of inequality is that they describe different phenomena and can even be entirely independent of one another. For example, it is possible for the income distribution to become increasing polarised, while

the income gap remains unchanged. Similarly, the income gap can increase without any polarisation taking place (Esteban and Ray 1994: p. 825; Hamnett 2012: p. 364). This study has therefore provided a discussion of these different measures of inequality in the labour market that demonstrates the logic of the methods and the kinds of results that they can produce.

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