

Measuring Income Inequality – A Holistic Approach

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Abstract

Income inequality across South Africa as a whole, as well as within organisations, has historically plagued the South African economy. Income inequality has traditionally been viewed from a single view point, most commonly the Wage Gap. The problem with making use of any single metric in isolation to quantify income inequality is that no single metric encompassing all aspects of income inequality exists. This paper looks at multiple methods for identifying and addressing income inequality at both macro and microeconomic levels and discusses the advantages and disadvantages of each approach. Furthermore, the overall benefits of using the discussed metrics in conjunction with each other in a multi-metric approach are explored. This multi-metric approach is then consolidated into a composite index, which is calculated using the results from the multi-metric approach. This provides the reader with a toolkit which can be used to analyse their remuneration policies and strategies from a holistic rather than single view point. It allows the user to not only identify but also address income inequality at a more granular (detailed) level than what has been done traditionally and ultimately provides the user with a more effective means of addressing income inequality.

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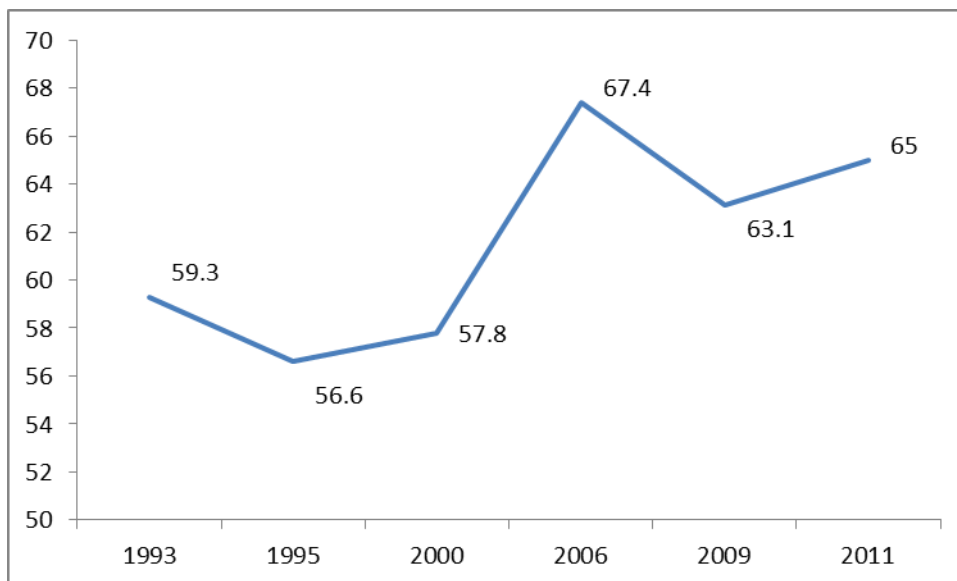
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I. INTRODUCTION

Historically, the South African economy has been afflicted by income and wealth inequality primarily as a result of inequitable policies during the Colonial and Apartheid era amongst other socio-economic reasons. When comparing each country's Gini Coefficient in terms of income and wealth, South Africa has persistently ranked in the top five most unequal countries in the world.

The Gini coefficient measures inequality in income in a country or organisation - the higher the coefficient, the greater the inequality. A measure of 1 displays total inequality (where the highest earner earns all the pay) whilst a measure of zero shows no inequality (where all people earn exactly the same). This inequality has remained present in the South African economy even after the first democratic elections took place in 1994 (Figure 1). Figure 1 has been indexed so that the values between 0 and 1 are between 0 and 100.

Figure 1: Historical View of the South African Gini Coefficient



* Source – World Bank Data

** Gini Coefficient data is not published every year and all available data points between 1993 and 2014 have been used. 2011 was the most recent data point available at the time of writing.

Figure 1 indicates that although there were initial gains in overall income equality at a macroeconomic level between 1993 and 2000, inequality increased significantly between 2000 and 2006 and is currently only slightly below the 2006 level. Currently, the 2011 figure of 65 is the highest reported by the World Bank for any country between 2010 and 2014. In

other words, according to the World Bank data, South Africa currently has the highest level of income inequality in the world.

It is very important to note that the national Gini Coefficient includes *ALL* persons in the economy, both employed and unemployed. As South Africa has a very high unemployment rate, the overall Gini Coefficient is dramatically increased.

Given these high levels of income inequality, it is not surprising that income inequality within individual companies has been the topic of much debate. The instrument most commonly used when measuring income inequality within a company is the Wage Gap, which can be briefly defined (defined more thoroughly later in the analysis) as the ratio of the CEO's pay to the median worker's salary. Unfortunately, the element of pay (specific line item on a payroll) used in this calculation is often not specified. This leaves this methodology open to interpretation, and hence abuse, as the person performing the calculation can decide on the element of pay to use (eg: Total Guaranteed Package would return a lower ratio than Total Earnings). There are other limitations to using the Wage Gap as a measure of income inequality (discussed more robustly later in this paper) which leads one to believe that the use of the Wage Gap in isolation can provide a distorted picture of the true state of inequality within the organisation.

The implementation of the Employment Equity Amendment Act 47 of 2013 has created a need for a more robust measure of internal equity which addresses company income inequality on a microeconomic rather than macroeconomic level within organisations. Macroeconomic studies have used a number of different methodologies for measuring income inequality at country or regional level. These methods include but are not limited to:

- Gini Coefficients
- Lorenz Curves
- Coefficients of Variation
- 10-10 Ratios
- Pay Differentials

Each of these methodologies measure income inequality from a different perspective and provides the user with different information. If a methodology could be found which makes use of a number of different income inequality measures, the result would be a more thorough understanding of the sources of income inequality within the organisation.

II. LITERATURE REVIEW

Income inequality has historically plagued the South African economy and as a result there is a substantial amount of policy which aims at curtailing it. There is also a large amount of literature which addresses the concept of income inequality for South Africa as a whole and within certain race, gender and education groups. Surprisingly, there is a shortage of research into income inequality at an organisational or company level. The Policy and Research sections of this literature review will be reviewed separately.

a) Policy

The Constitution (The Constitution of the Republic of South Africa, Act 108 of 1996, as amended) addresses inequality through section 9 in Chapter 2 of the Bill of Rights, which provides for equality and equal protection of the law to everyone (The Constitution of the Republic of South Africa, Act 108 of 1996, as amended – Chapter 2 Section 9(1)). In promoting the achievement of equality, legislative or other; measures may be taken to protect and advance persons, or categories of persons who were disadvantaged by unfair discrimination (The Constitution of the Republic of South Africa, Act 108 of 1996, as amended – Chapter 2 Section 9(2)). In other words, this allows for previously disadvantaged persons to receive certain preferential treatment in order to correct for the injustices of the past.

The legislative measures that were taken to promote such persons, or categories of persons, are the Labour Relations Act 66 of 1995, as amended and the Employment Equity Act 55 of 1998, as amended (hereinafter referred to as "the Employment Equity Act"). The Employment Equity Act makes provision for income differentials where an employer must take measures to progressively reduce disproportionate income differentials (Employment Equity Act 55 of 1998, as amended – Chapter 3 Section 27). This essentially places the onus on the employer to not only be aware of income inequality within their organisation but to address it as well.

In an amendment to The Employment Equity Act, unfair discrimination is addressed by placing the onus of proof on the employer (The Employment Equity Amendment Act 47 of 2013 - Section 6). If there is a complaint of unfair discrimination within an organisation, the

employer must prove why the alleged discrimination is not of an unfair nature. Section 6 specifically states that an employer cannot unfairly discriminate in terms of one or more of the following criteria:

- Race
- Sex/Gender
- Pregnancy
- Marital Status
- Family Responsibility
- Ethnic or Social Origin
- Colour
- Sexual Orientation
- Age
- Disability
- Religion
- HIV Status
- Conscience
- Belief
- Political Opinion
- Culture
- Language
- Birth
- Any arbitrary ground

A new schedule to replace the previous schedule of maximum fines payable for contravening The Employment Equity Act has been included in the amendments to The Employment Equity Act (The Employment Equity Amendment Act 47 of 2013 – Schedule 1). This is an indication of government's increased commitment to addressing issues of unfair income inequality within the work force. It should be noted, that discrimination is not deemed to be unfair if it is in line with affirmative action or is inherent to the job. On 29 September 2014, the Draft Code of Good Practice on Equal Pay for Work of Equal Value was published (South African Government Gazette – No.38031). Work of equal value is defined within three categories:

Same work:

- Work is identical or interchangeable

Substantially the same work:

- Work is not identical or interchangeable but sufficiently similar so that they can reasonably be considered to be the same
- Objective assessment of actual duties and responsibilities required

Work of equal value:

- Different jobs but compare relative complexity, responsibility, decision making level etc.

This requires a Job Evaluation system.

As stated previously, this legislation relates to unfair discrimination - therefore discrimination of a fair nature is acceptable as long as there are acceptable reasons for this discrimination.

Discrimination can be deemed to be fair if it is based on:

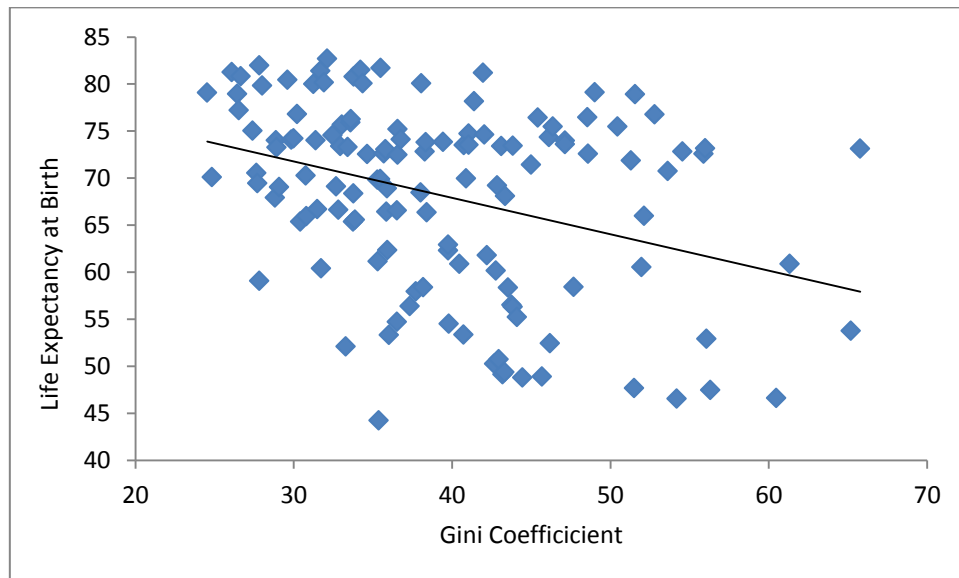
- Seniority/ length of service
- Qualifications/ ability/ competence/ potential
- Performance / quality of work / quantity of work - provided that the performance evaluation system is equally applied
- Fixing demoted employee's salary at a certain level until other employees in the same job category reach this level
- Temporary position for the purpose of training/gaining experience
- Shortage of relevant skill / market value in a particular job classification
- Any other relevant factor

The legislation is not confined to remuneration but also covers the terms and conditions of employment. In the context of this paper, the discussion regarding inequality will be confined to remuneration only.

b) Research

There has been a significant amount of research, focusing on the socioeconomic effects of income inequality. Specifically, this research has focussed on the relationship between the distribution of income and health as well as the relationship between the distribution of income and education. Mostafa, Saeed and Samira (2014) found that larger levels of inequality in income distribution were negatively correlated with life expectancy and also had a negative effect on infant mortality rates. Figures 2 and 3 analyse the data using scatter plot diagrams and confirm these findings.

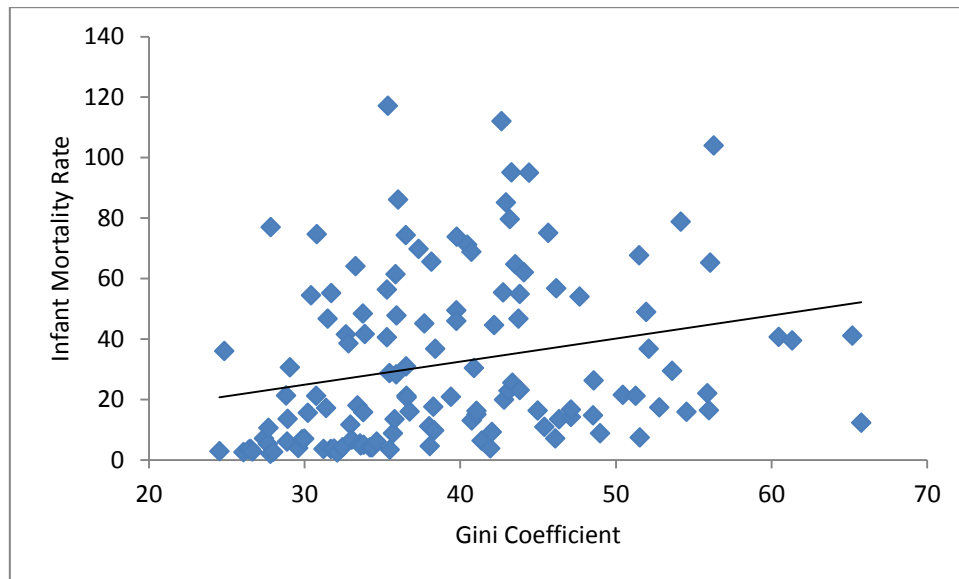
Figure 2: Correlation between Income Inequality and Life Expectancy at Birth



*Source: World Bank Data averaged between 2005 and 2014.

Figure 3: Correlation between Income Inequality and Infant Mortality Rate per 1000

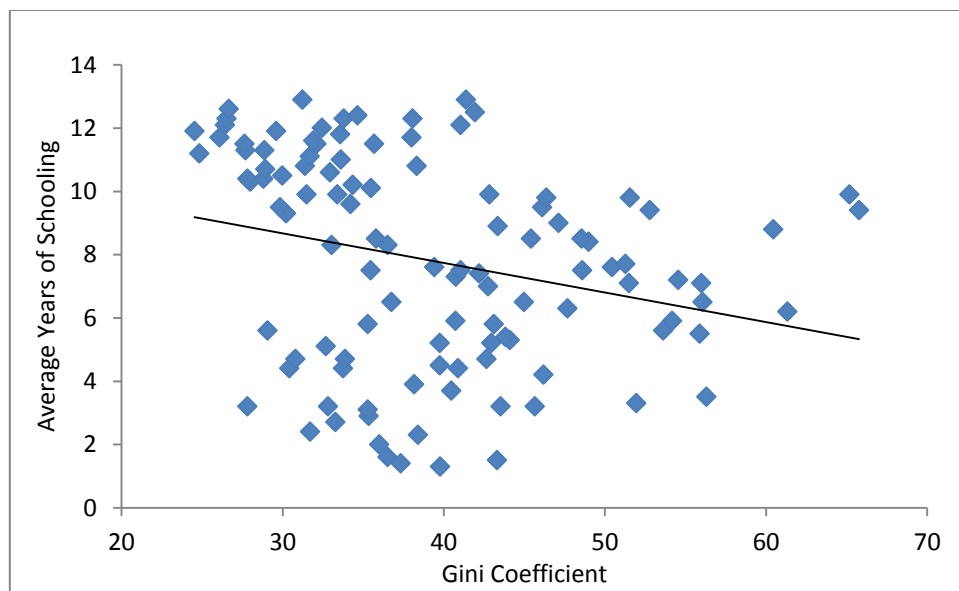
Live Births



*Source: World Bank Data averaged between 2005 and 2014.

De Gregorio and Lee (2002) found that there was a negative correlation between the distribution of income and average years of schooling. They also found that increasing the average years of schooling lead to lower levels of income inequality.

Figure 4: Correlation between Income Inequality and Average Years of Schooling



*Source: World Bank and United Nation Development Report

According to the sources used in Figures 2, 3 and 4 South Africa has a life expectancy at birth of 53.75 years, an infant mortality rate (per 1000 live births) of 41.08 and an average number of years of schooling of 9.9 years. These figures emphasise the importance of reducing the inequality in the distribution of income in South Africa.

Research into the subject of income inequality at a macroeconomic level in South Africa has been explored by a number of authors such as Finn, Leibbrandt & Woolard (2012), Azam & Rospabe (2005) and Casale & Posle (2010). All three of these papers investigated income inequality although each of these took a different view in terms of what they wished to measure. Finn, Leibbrandt & Woolard (2012) released a paper called '*Describing and Decomposing Post-Apartheid Income Inequality in South Africa*'. Using data between 1993 and 2008, this paper looked at the overall changes in income inequality, as well as the inequality within, and between, different race groups. They concluded that overall, income inequality increased during this period due to a larger proportion of income being earned by the top earning income decile. When the inequality was measured within and between race groups, they found that although the inequality between race groups had declined, the inequality within race groups had increased for all race groups.

The research performed by Azam & Rospabe (2005) and Casale & Posle (2010) looked specifically at the effects of trade unions on income inequality in South Africa, albeit from different viewpoints. Azam & Rospabe (2005) found that when trade unions were involved in wage determination, they reduced the level of income inequality between the white and black race groups. In contrast to this, Casale & Posle (2010) found that the gender wage gap is larger within the union than non-union sector of the South African labour market. These studies however, all look at inequality from a macroeconomic perspective. Considering the large amount of attention that internal equity in South Africa receives, the lack of studies at enterprise or microeconomic level is surprising. This lack of available data was one of the reasons why Solt (2008) created a methodology for standardising the World Inequality Database. Solt (2008) found that although the World Inequality Database contained a great deal of data regarding different measures of inequality within individual countries, the methodologies followed were not consistent.

In their paper titled '*Inequality and Unemployment in the Global Environment*', Helpman, Itskhoki and Redding (2009) analysed the reasons behind pay differentials and income inequality within companies. They found that larger companies and companies that exported

their products/services tended to pay higher wages. They also found that opening an economy from a previous state of autarky resulted in an initial increase in income inequality and unemployment. As no noticeable trend was evident regarding what happens to income inequality and unemployment in the long run, it can be concluded that these initial transformations in the economy did not necessarily persist.

In a paper titled 'Pay Differentials in the People's Republic of China: An Examination of Internal Equity and External Competitiveness' Chiu, Luk and Tang (2000) made use of remuneration data from a number of companies in order to test for various levels of inequality. These tests were carried out by size, sector and education in order to see which sub-categories within these categories suffered from the highest levels of income inequality. In order to find the best way of measuring income inequality within companies in South Africa it is essential to undertake this sort of microeconomic/company based analysis.

If the sample is large enough, there are a number of measures of inequality in macroeconomics which could be applied to the microeconomic/company environment. The Lorenz Curve developed by Max O. Lorenz in 1905 and the subsequent Gini Coefficient developed by Corrado Gini in 1912 are two examples of such measures. In order to fully understand the nature of inequality within an organisation and form a holistic view, a mix of both macroeconomic and microeconomic techniques are required.

III. METHODOLOGIES AND ANALYSIS

This section will focus on the evaluation of the various methodologies and their respective strengths and weaknesses. In order to illustrate how each methodology works and highlight its salient features, a practical example will be provided for each methodology. The practical example will be calculated using an audited and robust salary database. The data used is from the 21st Century database and these rows of data are classified into six industries in order to keep the individual companies which made up the constituents list, anonymous. The six industries are:

Table 1: Description of Industries

Type of Industry	Description
Extractive	Agriculture, Forestry and Paper, Mining, Oil and Gas
Transformative	Construction and Building, Utilities and Energy, Manufacture of Food, Textiles, Metal, Electrical, Machinery, Chemicals, Pharmaceutical and Automobile
Distributive Services	Communication, Retail, Transport and Logistics, Wholesale
Producer Services	Banking and Financial Services, Insurance, IT, Legal Services, Miscellaneous Business Services, Real Estate / Property, Research
Social Services	Education, Government, Hospital, Medical and Health Services, Non-Profit Organisations, Postal Services, SETAs, Welfare and Religious Services
Personal Services	Barber and Beauty Services, Domestic Services, Eating and Drinking, Entertainment and Leisure, Hotel, Laundry, Media and Advertising, Miscellaneous Personal Services, Repair Services

Each industry will be evaluated as if it were an individual company (all rows of data in an industry will be used). This will allow for each methodology to be evaluated in practice rather than purely in theory. The methodologies which will be evaluated are:

1. Wage Gap
2. 10 – 10 Ratio
3. Lorenz Curve and Gini Coefficient
4. Coefficient of Variation
5. Pay Differentials

a) Wage Gap

The Wage Gap is one of the most commonly used measures of income inequality at microeconomic (company level).

There have been a number of different methodologies used in order to calculate a “Wage Gap” and as a result, the credibility of these figures reported in the media is often the subject of debate. The methodology used in this analysis is calculated as:

$$\frac{\text{CEO Pay}}{\text{Median Pay of A, B, C Band Employees}}$$

This calculation provides the user with the ratio of how many times higher the CEO’s pay (chosen element of pay) is than the median worker’s pay. The median worker in this case is defined as the median A, B and C band worker and excludes management and specialist staff (Definitions of each Band can be found in Appendix 1). The benefits of using this methodology include:

- It is simple to compute.
- It is easily understood.
- It is inclusive from the point of view of the staff (denominator of the equation) as the median of all A, B and C band workers is used.

The weaknesses of the Wage Gap methodology include:

- It is easily manipulated. Example: By simply halving the CEO’s pay, the ratio will halve even if there has been no gain to the worker’s welfare.
- The grade of the “median employee” is unknown and therefore an organisation with a high number of lower level employees is more likely to have a higher wage gap.

Table 2: Wage Gap by Industry (Total Guaranteed Package)

Industry	Median A, B, C	Median Top 10 CEO's	Wage Gap
Extractive	R 110 156	R 10 541 000	95.69
Transformative	R 293 319	R 5 474 500	18.66
Distributive Services	R 224 352	R 10 642 000	47.43
Producer Services	R 157 508	R 9 197 000	58.39
Social Services	R 177 912	R 4 085 500	22.96
Personal Services	R 167 343	R 5 963 000	35.63
National	R 205 089	R 9 919 000	48.36

Table 2 illustrates the Wage Gap by industry. The median of the Top 10 CEO’s pay has been used (instead of only the highest paid CEO) as certain CEO’s in an industry with a high total

guaranteed package component of pay would skew the Wage Gap. The second column from the left indicates the median pay of the A, B and C Band workers in each industry. The second weakness, described above, is illustrated by the difference between the median worker's pay in the Extractive and Transformative industries. The median Extractive worker is a B1 whereas the median worker in the Transformative industry is a C1. As a result, the Extractive industry has the highest Wage Gap out of all of the industries, as its median A, B and C band worker is at the lowest grade. The limitations in this methodology are not exclusive to the Wage Gap.

There are a number of measures of income inequality which can be calculated, all with their own benefits and limitations.

b) 10 -10 Ratio

In macroeconomics, the 10 -10 Ratio (sometimes called a Rich / Poor or R/P Ratio) is often used as a crude measure of inequality when all the data needed to calculate a Gini Coefficient is not available. Although it is similar to the Wage Gap (in that it measures the ratio of the highest paid employee to the lowest paid employee), it is more inclusive than the Wage Gap as it uses a number of employees (rather than a single employee) as the numerator. It is more inclusive than the Wage Gap as the highest earning 10% of employees are analysed rather than only the CEO. It is calculated as

$$\frac{\sum \text{Highest 10\% of Employee's Pay}}{\sum \text{Lowest 10\% of Employee's Pay}}$$

The benefits of this methodology are:

- It is easy to calculate
- It is more inclusive than the standard Wage Gap in terms of how the numerator is calculated
- It cannot be manipulated as easily as any intervention would have to impact the majority of the top or bottom 10% of earners.
- If more data is available, it can quite easily be converted to a 20 – 20 ratio which would provide more information.

The disadvantages are:

- It does not provide information regarding the other 80% of the sample
- Limited inference can be made as the distribution between the top and bottom 10% is unknown.

The 10 -10 Ratio is therefore best used in conjunction with a Wage Gap analysis as it will alert the user to structural issues within the data if they return significantly different results.

The 10 – 10 Ratios by industry in South Africa are listed in Table 3.

Table 3: 10 – 10 Ratios by Industry (Total Guaranteed Package)

Industry	10 to 10 Ratio
Extractive	11.16
Transformative	12.06
Distributive Services	11.26
Producer Services	26.14
Social Services	14.12
Personal Services	15.17
National	14.21

Table 3 indicates that the top earning 10 per cent of employees in the Producer Services industry earn approximately 26 times more than the bottom earning 10 per cent of employees. In direct contrast to the Wage Gap result, the Extractive industry is the most equitable industry when performing a 10 – 10. One may ask “how is it possible that the Extractive industry has the highest Wage Gap and the lowest 10 – 10 Ratio?” The answer lies in the distribution of the data. The Extractive industry has a large number of lower grade employees (median grade B1). These B1 employees however are well paid relative to B1 employees in other industries. This trend, in the Extractive industry, of paying lower grade employees at higher levels than other industries persists into the A-Band. This results in the bottom 10 per cent of earners in the Extractive industry earning more (on average) than the bottom 10 per cent of employees in other industries.

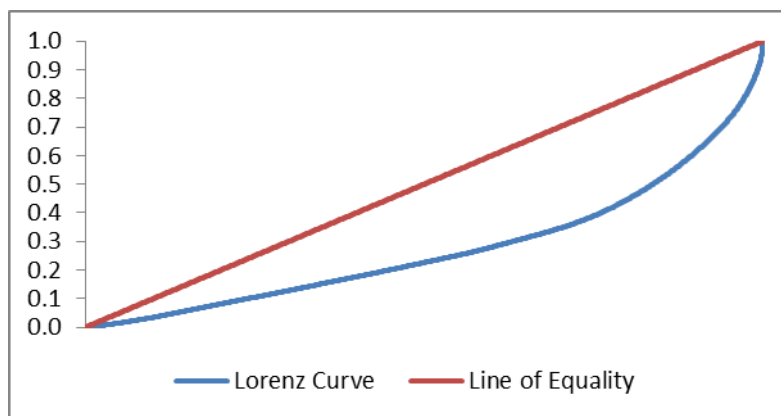
This example illustrates the need to make use of both the Wage Gap and the 10 – 10 Ratio when making decisions regarding income inequality between the top and bottom earners in a company. The Wage Gap (rather than the 10-10 ratio) spotlights the CEO’s pay. However, the Wage Gap can be easily manipulated by simply changing the CEO’s pay. An example of this would be if the CEO’s pay was halved, the Wage Gap would halve (provided that all other employees’ pay is held constant). In contrast, at least 10 per cent of employees need to

have their pay altered in order to manipulate the 10 – 10 Ratio, thus making it more resistant to the possibility of being subject to game / tournament theory. As a result the 10 -10 Ratio is more inclusive when analysing employee welfare (in terms of pay) than the Wage Gap is.

c) Lorenz Curve and Gini Coefficient

These measures are traditionally used in macroeconomics to measure the inequality within a distribution (in this case income). The Lorenz Curve is a graphical illustration of the distribution of pay (from lowest to highest) as illustrated in Figure 2. The X-Axis is the number of individuals in the sample, ranked from the lowest to highest earning. The Y-Axis is the cumulative income earned as a percentage of the total. In Figure 2, the first 10 per cent of cumulative income is earned by approximately 20 to 25 per cent of the sample. Similarly the last 10 per cent of cumulative income is earned by the highest earning one or two per cent. Only the employed are considered in this paper and therefore the term income is tantamount to the individual’s total guaranteed package.

Figure 2: A Lorenz Curve



The Gini Coefficient is calculated from the Lorenz Curve. In layman’s terms it measures the area between the “Line of Equality” (when everyone earns exactly the same) and the Lorenz Curve which is the cumulative distribution of all incomes in the sample, ranked from lowest to highest. The greater the distance (area) between the Line of Equality and the Lorenz Curve, the more unequal the income distribution is. The methodology can be simply stated as follows:

$$\frac{\text{Area between Line of Equality \& Lorenz Curve}}{\text{Total Area Under Line of Equality}}$$

The benefits of this methodology are:

- It makes use of the entire population of the sample rather than only a subsection and therefore provides a more inclusive picture of income inequality.
- For over a century it has been recognised in economics as one of the leading measures of income inequality.

The weaknesses associated with this methodology are:

- A small sample may result in biased results.
- It can be computationally difficult to calculate.
- Does not provide a measure of inequality within sub-sections of the population

The Gini Coefficient's ability to provide an all-inclusive measure of income inequality is the most advantageous feature of this methodology. A methodology which provides a measure of inequality between sub-sections is the Coefficient of Variation. Table 4, contains the Gini Coefficient of each industry in South Africa.

Table 4: Gini Coefficient by Industry

Industry	Gini Coefficient
Extractive	0.449
Transformative	0.362
Distributive Services	0.357
Producer Services	0.504
Social Services	0.417
Personal Services	0.443
National	0.416

Table 4 indicates that the Transformative industry has the least income inequality and the Producer Services industry has the most. It may seem counter intuitive that the current Gini Coefficient for the whole of South Africa exceeds the Gini Coefficient for each industry. The reason for this is that in this analysis, only employed persons are included. In other words, the Gini Coefficients in Table 4, calculate the inequality between employee's total guaranteed package (the chosen element of pay) in each industry. In contrast, the national Gini Coefficient includes all persons in the economy and as stated earlier in the paper, South Africa's high unemployment rate increases the overall Gini Coefficient. Following on with our example in the previous sections which is analysing the Extractive industry, this industry

is the second most unequal in terms of the Gini Coefficient. Given, what we know regarding the Wage Gap and 10 – 10 ratio, we know that the source of the inequality must be the 80 per cent of the population (between the top and bottom 10 per cent of earners). In other words, the source of inequality does not sit at the extremes of this distribution. This measure again adds a new dimension to the picture that has been painted regarding income inequality within the Extractive industry.

d) Coefficient of Variation

In statistics, the Coefficient of Variation is defined as a normalized measure of dispersion within a sample and is calculated as:

$$\frac{\text{Sample Standard Deviation}}{\text{Sample Median}}$$

This methodology allows one to analyse how dispersed an individual's pay is relative to the rest of their peer group (sample). In the case of measuring income inequality at the microeconomic/company level, the sample would include other employees at the same grade as the individual being assessed.

The benefits of this methodology are:

- It can be used to analyse sub-samples within a population. Example: It can be used to calculate inequality within each grade.
- It can be used to measure macro and micro levels of inequality and therefore on its own it can provide more information than other measures.
- It is easier to calculate than other methodologies, such as the Thiel Index, which analyse inequality within sub-samples.

The disadvantages to this methodology:

- A large enough sample within each sub-sample is required in order to be able to make comparisons between sub-samples and draw significant inference from the analysis.
- Biased results can be produced if the distribution of the data is far from a normal distribution, as the standard deviation may be excessively high due to outliers in the data set.

The Coefficient of Variation has the potential to provide the most holistic view of income inequality of all the measures discussed within this analysis. However, given the weaknesses of this methodology it would not be prudent to simply use this method in isolation. Table 5 Contains the Coefficient of Variation per grade for each industry:

Table 5: Coefficient of Variation by Grade and Industry

Grade	Extractive	Transformative	Distributive	Producer	Social	Personal	National
A1	0.32	0.48	0.4	0.44	0.18	0.13	0.56
A2	0.38	0.27	0.34	0.54	0.43	0.13	0.46
A3	0.18	0.27	0.25	0.38	0.26	0.23	0.27
B1	0.09	0.39	0.42	0.5	0.31	0.25	0.30
B2	0.19	0.3	0.25	0.38	0.34	0.28	0.31
B3	0.25	0.31	0.29	0.46	0.4	0.34	0.39
BU	0.3	0.3	0.22	0.41	0.31	0.4	0.34
C1	0.33	0.28	0.24	0.46	0.31	0.43	0.34
C2	0.24	0.22	0.14	0.36	0.31	0.39	0.27
C3	0.27	0.26	0.23	0.37	0.31	0.4	0.31
CU	0.2	0.21	0.19	0.47	0.37	0.5	0.29
D1	0.22	0.26	0.23	0.33	0.29	0.49	0.33
D2	0.38	0.2	0.24	0.27	0.25	0.42	0.31
D3	0.19	0.17	0.23	0.27	0.23	0.51	0.25
DU	0.19	0.17	0.22	0.28	0.25	0.33	0.27
EL	0.22	0.22	0.25	0.29	0.29	0.27	0.28
EU	0.37	0.23	0.24	0.29	0.27	0.24	0.33
FL	0.24	0.26	0.46	0.42	0.36	0.28	0.46
FU	0.78	0.25	1.17	0.56	0.53	0.43	0.87
<u>Weighted Avg</u>	<u>0.2</u>	<u>0.25</u>	<u>0.23</u>	<u>0.41</u>	<u>0.32</u>	<u>0.4</u>	<u>0.32</u>

Table 5 indicates that relative to the other industries, the Producer Services industry has a relatively large amount of inequality from A1 to CU. Similarly, Personal Services experiences relatively large amounts of inequality from BU to DU. It may seem surprising that, once more, the Extractive industry is the most equitable when looking at the weighted average of the Coefficient of Variation (weighted by the number of incumbents per grade). This indicates that the source of the income inequality indicated by the Gini Coefficient has not come from within the individual grades but rather between the grades.

In the South African context, the Coefficient of Variation provides a particularly good framework for investigating whether the principle of equal pay for work of equal value is being adhered to.

e) Pay Differentials

Pay Differentials are typically calculated in order to express one individual's pay as a ratio of another individual or sample median's pay:

$$\frac{\textit{Individual's Pay}}{\textit{Other Individual or Sample Median Pay}}$$

If the numerator is replaced by "CEO Pay" and the sample median in the denominator was "Median A, B and C Band Workers" this becomes the Wage Gap which we have already addressed earlier in this chapter.

What separates this section from the section on the Wage Gap is ability of this methodology to be combined with the Coefficient of Variation in order to provide meaningful information regarding the concept of Equal Pay for Work of Equal Value. The Coefficient of Variation allows one to identify the grades which contain the largest amount of income inequality. Pay Differentials allow one to identify the exact individuals which are causing the inequality at each extreme (low and high outliers). By addressing the sources of the income inequality within each grade, the income inequality within each grade will reduce, hence reducing the overall weighted average of the Coefficient of Variation. This ultimately results in lower levels of income inequality between workers who are performing substantially the same work and in increased compliance with the Equal Pay for Work of Equal Value policy.

The benefits of this methodology are:

- The individuals with the most unequal pay in the organisation are highlighted.
- Addressing the most unequal individuals will reduce the income inequality within the organisation.

Disadvantages of this methodology:

- It is purely an internal detection tool and therefore cannot be compared to other samples. The most unequal (income) individuals will be highlighted but it does not shed any light on how these employees should be addressed.

- External comparisons cannot be made and therefore benchmarking what is acceptable isn't possible.

As described in the disadvantages of this methodology, this measure cannot be compared across industries. It is for this reason that this measure has been omitted from the calculation of the Income Inequality Scores detailed later in this paper (The examples are based on industries rather than individual organisations in order to keep each individual company's data confidential).

IV. REVIEW OF INDUSTRY RESULTS

Reviewing the industry specific examples in each of the measures of inequality discussed in the previous section allows one to draw the following conclusions for each industry.

a) *Extractive:*

The Extractive industry has the highest Wage Gap but lowest 10 – 10 Ratio. This implies that although there are a large number of lower level employees within this industry, they are paid relatively well when compared to the top 10 per cent of earners. It also implies that CEO pay is high in this industry. The Gini Coefficient is the second highest in the industry analysis and is once again the most equitable when looking at the weighted Coefficient of Variation. This implies that the source of inequality within this industry lies with the 80% of individuals between the bottom and top 10 per cent of employees. This inequality is not within individual grades as evidenced by the low Coefficient of Variation values and therefore the source must lie between, rather than within, grades.

b) *Transformative:*

This industry has the lowest Wage Gap as a result of the median worker having a higher grade relative to other industries. In terms of the 10 – 10 ratio it has the third lowest ratio, albeit that it is less than 1 point away from the top two. The Transformative Industry is therefore fairly equitable when comparing the highest to lowest earners using these two methods. The Gini Coefficient and Coefficient of variation are second and third lowest in the comparison respectively. The main sources of internal equity issues within grades lie at A1 and again from B1 to BU (shown by the Coefficients of Variation), although these Coefficients of Variation are still quite low relative to other industries.

All in all, there is relatively little income inequality within this industry compared to the other industries.

c) *Distributive Services:*

This industry has the third highest Wage Gap, albeit that it is significantly higher than the lowest three. The 10 – 10 Ratio is the second lowest, 0.1 points higher than the Extractive industry. The source of the relatively high Wage Gap is due to relatively highly paid CEO's within the industry. The 10 – 10 Ratio suggests that the rest of the

top 10 per cent of earners, do not earn excessively large amounts when compared with the lowest earning 10 per cent. This industry has the lowest Gini Coefficient and second lowest weighted Coefficient of Variation which indicates that there is very little income inequality within grades and between grades within this industry.

d) *Producer Services:*

The Producer services industry has the second highest Wage Gap and the highest 10 – 10 ratio. This suggests that the income inequality between the top and lower earners is not only between the workers and the CEO's but also between the lowest earning workers and top level management (top earners). When comparing income inequality across the whole industry, this industry has the largest Gini Coefficient and highest weighted Coefficient of Variation which indicates that the source of inequality within this industry is not only between upper and lower levels of employees but also between employees on the same level. Looking at the Coefficients of Variation for each grade in this industry, the largest source of income inequality within grades is for all grades between A1 and CU (general staff).

e) *Social Services:*

This industry has the second lowest Wage Gap, marginally higher than the Transformative Industry. It also has the third largest 10 – 10 ratio which indicates that there is relatively more inequality between the lowest and highest 10 per cent of earners than between general staff and CEO's. The Gini Coefficient is the third lowest in the comparator group and the Weight Coefficient of Variation is the third largest, albeit significantly lower than the highest two. There does not appear to be any trend regarding which bands of employees have excessively high income inequality between them (A2 and B3 are the highest of the general staff levels). The source of the slightly higher weighted Coefficient of Variation (relative to the Extractive, Transformative and Distributive Services industries) is due to slightly increased levels of inequality at most levels when compared to the other three industries.

f) *Personal Services:*

The Wage Gap in this industry is the third lowest. In contrast to this, the 10 -10 Ratio is the second highest after the Producer Services industry. This suggests that relatively speaking, there is more inequality between the highest and lowest earners than between general staff and CEO's. This industry has the third highest Gini Coefficient (marginally behind the Extractive industry) and has the second worst weighted

Coefficient of Variation, marginally behind the Producer Services industry. This indicates that the income inequality persists at all levels within this industry, particularly for all grades between BU and DU (illustrated by the relatively high Coefficients of Variation for these grades).

The brief review of results for each industry clearly illustrates the power of a multi-measure approach versus merely analysing the Wage Gap. The Wage Gap and the 10 – 10 Ratio which are measures of “Top vs Bottom” income inequality often yielded different results (such as within the Extractive Industry). This indicates that there are elements of income inequality which cannot be completely captured with a single measure of income inequality. Similarly, the Gini Coefficient and Coefficient of Variation are measures of income inequality across the whole sample and within sub-samples respectively. Used in conjunction with each other these two measures can analyse whether the income inequality is sample-wide and if so, can identify which actual sub-samples are driving this company wide income inequality. Pay Differentials can be used in order to analyse the exact individuals within each grade that are causing the high Coefficient of Variation values. Once these individuals have been identified, corrective action can be taken in order to bring each measure of income inequality in line with what is considered acceptable by the company and its stakeholders.

V. SUMMARY OF RESULTS – INCOME INEQUALITY SCORE

The results discussed in Sections 4 and 5 of this paper provide insight regarding how each industry compares against the other industries for each metric. This information is useful as it allows the reader to compare the relative performance of each industry for each metric but does not allow the reader to form a holistic view of overall performance at a glance. Consolidating the above information into a single performance score has the advantage of providing an overall view of each industry’s performance relative to a comparator (the national market in this analysis) without having to study the detail of the report.

This consolidation takes place by turning the set of results in each metric into a relative score compared to the national market and then providing an equal weighting to each relative score to obtain a final Income Inequality Score. These relative scores are calculated as:

$$1 - \frac{(\text{Industry Metric} - \text{Comparator Metric})}{\text{Comparator Metric}}$$

All of the individual metrics are calculated in such a way that higher values correspond to larger income inequality. For this reason the relative ratio is subtracted from 1. It normalises each relative score so that scores above 1 indicate positive performance (less inequality than the comparator) and scores below 1 indicate negative performance (more inequality than the comparator). An equal weight is applied to each relative score and calculated into the final Income Inequality Score. In other words, each relative score is added together and divided by the number of scores. Since a smaller result for each of these scores is desirable and each measure tests inequality in a different way, the lower the mean score the better the score of inequality will be. Table 6 contains a summary of these scores.

Table 6: Summary of the Relative Scores and Income Inequality Score

Industry	Wage Gap	10 - 10 Ratio	Gini Coefficient	Coefficient of Variation	Income Inequality Score
Extractive	0.02	1.21	0.92	1.37	<u>0.88</u>
Transformative	1.61	1.15	1.13	1.22	<u>1.28</u>
Distributive Services	1.02	1.21	1.14	1.28	<u>1.16</u>
Producer Services	0.79	0.16	0.79	0.72	<u>0.61</u>
Social Services	1.53	1.01	1.00	1.00	<u>1.13</u>
Personal Services	1.26	0.93	0.94	0.75	<u>0.97</u>

*Pay Differentials are excluded from this table as they are an internal tool used to identify outliers within each company and therefore cannot be compared across industries.

Table 6 allows the reader to view how each industry's metrics compare to the national market as well as how the industry compares to the national market overall. An Income Inequality Score of 1 means that overall; the industry experiences the same amount of inequality as the national market. A score below 1 (Extractive, Producer and Personal Services) indicates that the industry experiences more inequality than the national market. A score above 1 (Transformative, Distributive and Social Services) indicates that the industry experiences less inequality than in the national market. Ranked from most unequal to least unequal the most unequal industries in South Africa are:

1. Producer Services
2. Extractive
3. Personal Services
4. Social Services
5. Distributive Services

6. Transformative

VI. CONCLUSION

Income inequality has been at the forefront of many socioeconomic debates within South Africa. This income inequality, at a macroeconomic level, is inherent to the economy as a result of the Colonial and Apartheid eras which have been in place for much of South Africa's history. This legacy of income inequality is not only at macroeconomic level but can often be found within organisations. This inequality has typically been measured using the Wage Gap.

The Wage Gap provides a good starting point for addressing income inequality within an organisation but on its own it does not provide a holistic view. The five measures of income inequality all have their own strengths and weakness. These weaknesses can be mitigated by making use of multiple measures of income inequality. If a multi-measure approach is followed, the concept of income inequality can be addressed from a more holistic point of view than in isolation. In the context of the Equal Pay for Work of Equal Value policy, a multi-measure approach allows for the identification of income inequality at various levels, namely:

- Across the entire organisation
- Within individual grades
- At individual level within grades or jobs

A holistic and realistic view of income inequality within an organisation emerges when income inequality is addressed at each of the levels discussed previously in this paper. This view will meet both policy and socioeconomic demands and will ultimately translate into a more equitable labour market.

Bibliography

- Azam, JP & Rospabe, S. 2005, “*Trade Unions vs Statistical Discrimination: Theory and Application to Post-Apartheid South Africa*”, University of Toulouse.
- Casale, D & Posle, D. 2010, “*Unions and the Gender Wage Gap in South Africa*”, *Journal of African Economies*, Vol. 20, pg 27 – 59.
- Chiu, R. Luk, V. & Tang, T. 2000, “*Pay Differentials in the People’s Republic of China: An Examination of Internal Equity and External Competitiveness*”, *Compensation and Benefits Review* May/June 2000, Sage Publishing.
- De Gregorio, J & Lee, J. 2002, “*Education and Income Inequality: New Evidence from Cross-Country Data*”, *Review of Income and Wealth*, Series 48, No. 3
- Department of Labour, “*Employment Equity Act, No. 55 of 1998 (as amended), Draft Code of Good Practice on Equal Pay for Work of Equal Value*”, Government Gazette No. 38031, 29 September 2014.
- Department of Labour, “*Employment Equity Act, No. 55 of 1998*”, South Africa. Available from <http://labour.gov.za> [Accessed 12 January 2015]
- Helpman, E. Itskhoki, O & Redding, S. 2009, “*Inequality and Unemployment in a Global Economy*”, Centre for Economic Performance Discussion Paper No. 940.
- Leibbrandt, M. Finn, A & Woolard, I. 2012, “*Describing and Decomposing Post-Apartheid Income Inequality in South Africa*”, Routledge, Available from <http://www.tandfonline.com/loi/cdsa20>, [Accessed 28 November 2014].
- Mostafa, E. Saeed, S & Samira, P. 2014. “*Income Inequality and Health in Organization of Islamic Countries*”. *Journal of Macroeconomics*, Volume 9, Number 17, pg 141 - 160
- Solt, F. 2008, “*Standardising the World Income Inequality Database*”, Luxembourg Income Study Working Paper Series No. 496.
- South African Parliament, “*The Constitution of the Republic of South Africa, Act 108 of 1996, as ammended*”, Available from

http://www.parliament.gov.za/live/content.php?Category_ID=11 [Accessed 3 December 2014]

Appendices

Appendix 1: Basic Description of Bands

Band	Basic Description
F	Top Management
E	Senior Management
D	Middle Management / Professionals
C	Skilled Workers / Advanced Operational
B	Semi-Skilled Workers / Operational
A	Basic Skills