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HAPPINESS DISPARITIES IN SOUTH AFRICA: AN ANALYSIS OF TRENDS AND DETERMINANTS

By

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Abstract

The fast-growing prominence of happiness inequality is accompanied by a slow growth of happiness inequality literature. The happiness inequality literature is coming amidst growing concerns about the legitimacy of income inequality as a measure of inequality. The paper aims to be part of the growing happiness inequality literature by investigating these following equations: **Is happiness inequality also increasing similarly to income inequality in South Africa, and how do determinants of happiness affect happiness inequality?** South Africa is an unequal society it is therefore, imperative to ascertain whether inequality is high when inequality is measured in happiness inequality. Happiness inequality (**decreasing)** trends differently from income inequality (**increasing**). This means that happiness inequality may be a supplement measure of inequality together with income inequality since happiness inequality is decreasing. In addition, this paper's trend findings are limited since the paper's trend is based on only four years of survey. It is possible that a longer period of data might show a different trend. Some of the paper's determinants results are similar to previous studies; especially the relationship between income inequality and happiness inequality. Previous studies found no relationship between income inequality and happiness inequality, the paper founds the same results.

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1. Intshayelelo/ Introduction

A growing area of research in economic development is embedded in the belief that human development needs to be measured, not solely on the criteria of income and physical well-being but should be broadened beyond income-related measurements. However, while there is much literature on happiness and income inequality, there is little on happiness inequality itself.

Newman (2016: 1) describes happiness inequality as "the psychological parallel to income inequality: how much individuals in a society differ in their self-reported happiness levels — or subjective well-being, as happiness is sometimes called by researchers". Income inequality has been a prominent measure of inequality, but there is an increase in studies (Veenhoven, 2005; Helliwell, et al., 2017) that have reservations about it as a measure of inequality.

South African inequality is measured in income inequality. According to Statistics South Africa (StatsSA, 2014), in 2011 the Gini coefficient as the measure of income inequality in South Africa, was approximately 0,65 based on expenditure data (per capita excluding taxes) and 0,69 based on income data (per capita including salaries, wages and social grants). South Africa is not the only country with high disparity in income and it is also found in global measurements which, according to Veenhoven (2005: 457), also show an increase in inequality. "It is said that inequality is returning to modern nations and that this is manifest in the widening disparities in income in the late 20th century".

Despite the general belief in the literature that inequality is high globally some researchers (Clark, Fleche & Senik, 2012; Niimi, 2016; Stevenson & Wolfers, 2008; Veenhoven, 2005) reveal contrary findings by using happiness inequality as a measure of inequality. The proposals to supplement (Niimi, 2016) and to replace (Veenhoven, 2005) **income** inequality with **happiness** inequality as a measure of inequality have since fuelled the debate about the appropriate measure of inequality. Veenhoven's (2005) proposal for a different measure of

inequality, namely happiness inequality, follows from his findings that inequality decreases when measured with happiness inequality.

The increasing trends in inequality measurement in the literature (Clark et al., 2012; Gandelman & Porzecanski, 2013; Niimi, 2016; Stevenson & Wolfers, 2008; Veenhoven, 2005) when measured in happiness disparity Helliwell et al., (2017) also state that happiness inequality may outperform income inequality as a determinant of happiness. The growing importance of happiness inequality also makes the paper's objective of studying happiness inequality an imperative.

Becchetti, et al. (2014) state that happiness inequality literature is rare, and the few studies that exist, such as Stevenson and Wolfers (2008), Dutta and Foster (2011), and Van Praag (2011) are conducted in developed countries where an increase in income does not affect happiness. The studies conducted on these issues are based on developed countries; Stevenson and Wolfers (2008) is based on the United States of America, Clark et al. (2012) and Becchetti, et al. (2014) are both based on Germany and Niimi (2016) is based on Japan. This is seen as an opportunity for the researcher to conduct a study in a developing country where income affects happiness.

What also motivates this paper to be part of the debate is firstly, the fact that inequality is a thorny subject in South Africa, and secondly, that the increasing global trend to measure happiness inequality as opposed to income inequality has not yet been conducted on South Africa. Therefore, this researcher will conduct a study on these issues in South Africa, which is categorised as a developing country. Another motive is that it is, in part, the objective of the South African government to decrease inequality and (while not explicitly expressed), its citizens' happiness is also vital. Helliwell, et al. (2017: 34) state in their *World Happiness Report Update 2016* that: "well-being inequality may be as or more relevant than the more commonly used measures of inequality in income and wealth". In this paper, therefore, the terms 'happiness' and 'subjective well-being/life satisfaction' are henceforth used interchangeably in

an attempt to explore inequality as measured by happiness disparity and to study determinants of happiness inequality.

The paper has two research questions:

> **Is happiness inequality increasing together with income inequality in South Africa, and how do determinants of happiness affect happiness inequality?**

The first objective is to compare the trend analysis of measuring happiness inequality and income inequality to follow the suggestions for a different measure of inequality besides income inequality. After the trends of happiness inequality and income inequality are established, the researcher will then observe if the inequality trends are different (or similar) between these two measurements of inequality. This draws on previous South African literature based on income inequality as opposed to happiness inequality as this is what the study seeks to answer, namely: **Is happiness inequality increasing together with income inequality in South Africa?** The paper finds that happiness inequality (**decreasing)** trends differently from income inequality (**increasing**).

The second part of the question involves studying the effects of happiness determinants on happiness inequality, namely:

How do the determinants of happiness affect happiness inequality?

There is considerable literature on determinants of happiness and how they affect happiness but there are limited studies of happiness inequality and the effects of happiness' determinants. The studies of determinants of happiness date back beyond Easterlin's (1974) review of the relationship between income and happiness as they can be found in the writings of Aristotle, in the Classical Economists, through to Bentham's Utilitarian philosophy.

The paper will study whether a determinant affects happiness inequality similarly to happiness. "Most utility functions assume that higher levels of current personal income lead to higher utility. In 1974, Richard Easterlin introduced happiness data into economics and observed that

their basic pattern was at odds with this assumption" (as cited in Di Tella & MacCulloch, 2006: 26). Easterlin (1974) found no effect on happiness when income increases, and such findings have led to the surge in the study of happiness by many researchers following suit with studies of the relationship between income and happiness. These include: Ng (1978), Myers and Diener (1996), Oswald (1997), Kenny (1999), Diener (2000), Di Tella, MacCulloch and Oswald (2001), Frey and Stutzer (2002), Frijters Haisken-DeNew and Shields (2004), Di Tella and MacCulloch (2006), Veenhoven and Hagerty (2006), Clark *et al* (2008), Mahadea and Rawat (2008), Stevenson and Wolfers (2008), Diener, Harter and Arora (2010), Veenhoven (2012) and Diener, Tay, and Oishi (2013). This paper's research on the relationship between income and happiness inequality finds that income does not affect happiness inequality.

The paper follows the trend analysis by studying the determinants' effects on happiness inequality and begins with the examination of happiness and happiness determinants by using the Robust Ordinary Least Squares (OLS) and fixed effects regressions. The Robust OLS disregards outliers and thus cannot give a holistic picture of how determinants affect happiness at various levels of happiness besides the mean. Therefore, this study looks at how determinants of happiness affect various levels of happiness distribution using quantile regressions. This study finds different effects by determinants at various levels of happiness distribution.

This prompted the use of quantile regressions in this study to ascertain at which level of happiness each determinant affect happiness. Firstly, the study separated happiness distributions between lower quantiles (10^{th}, 25^{th} and median) and higher quantiles (75^{th} and 90^{th}). People at lower quantiles are assumed to have lower happiness compared to those at higher quantiles. The difference between lower happiness and higher happiness is the level of happiness inequality. Since happiness determinants affect happiness differently at different levels of happiness this leads to different scenarios that inform the researcher whether the determinant of happiness increases or decreases or has no effect on happiness inequality.

Previous studies (Becchetti et al., 2014; Niimi, 2016) of happiness inequality used the happiness literature to select the determinants of happiness inequality, and this paper follows suit with the following determinants of happiness inequality for a developing country:

- education
- income
- income inequality
- relative mechanism determinants
- employment
- age
- marital status
- gender
- health
- access to credit
- geographic type
- basic household needs
- crime
- race
- religion.

Previous studies of happiness inequality focussed on developed countries with higher per capita income levels. The consecutive studies by Veenhoven (2005), Stevenson and Wolfers (2008), Becchetti et al. (2014) found no effect on happiness inequality was caused by income inequality, and this paper finds the same results although this was unexpected.

This study is arranged as follows: **section 2** studies the background of the happiness inequality literature; **section 3** explains methodology, data and variables, and descriptive analysis of the data; **section 4** covers the results and the discussion of the findings and that is followed by **section 5** which covers the conclusion and recommendations.

2. Uphengululo Lwezibhalo/ Literature Review

2.1 Cross country happiness disparities

The study of happiness dispersion began with a cross-country study where the happiness inequalities of each country were compared and differences between their levels of happiness inequalities were analysed. Veenhoven (1990) found that distribution of happiness inequality between nations differed because happiness is more equally distributed in democratic and economically developed nations that are characterised by:

- minor income variances
- high social security
- equal education opportunities,

While these characteristics are considered more noticeable in the rich than in the not-so-rich countries Veenhoven (1990), did not study the trends and the determinants of happiness inequality within each country.

2.2 Trend Analysis

Nonetheless, Veenhoven's (1990) study of the differences in happiness dispersion laid the ground for researchers to study happiness inequality within a country as opposed to comparing happiness distributions among countries. The studies based on inequality measured in income, reported global inequality to be increasing. Veenhoven's (2005) proposal to measure inequality by dispersion of life-satisfaction found a decline in the standard deviation of a decrease in life satisfaction inequality in most observations in the European Union, Japan and United States of America.

The findings of decreasing happiness inequality as opposed to the general notion of increasing income inequality then propelled other studies to compare the trends in income and happiness

inequalities. Stevenson and Wolfers (2008), Clark et al. (2012), Gandelman and Porzecanski (2013), Niimi (2016) all found that happiness inequality **decreased** while income inequality increased in their respective studies, namely, the United States of America, Germany, and in Japan. However, Becchetti, et al. (2011) found an increase in happiness inequality with an increase income inequality in Germany. Therefore, with the exception of Becchetti, et al. (2011, 2014) these few previous studies based on developed countries, exhibited a difference in trends between happiness inequality and income inequality. Consequently, there is room for more research to compare happiness inequality with income inequality trends in developing rather than developed countries. This report, therefore, aims to add to the analysis by studying happiness inequality trends in South Africa.

2.3 Determinants analysis

Happiness inequality studies are not only based on trends analysis. The studies of determinants of happiness inequality by the aforementioned Veenhoven (2005), Stevenson and Wolfers (2008), Clark et al (2012), Becchetti et al (2014 and 2011) and Niimi (2016) are worth noting further. Veenhoven (2005) found a negative relationship between economic development, freedom in private life, informatisation, urbanisation, education and tolerance, and that income inequality is not strongly related to life satisfaction inequality. Stevenson and Wolfers (2008), Clark et al. (2012), Becchetti et al. (2014) and Niimi (2016) also found a negative relationship between economic development and happiness inequality, and that income inequality is not a significant determinant of happiness inequality. Moreover, by basing the selection of determinants of happiness inequality on the literature, Becchetti, et al (2014) and Niimi (2016) identified determinants of happiness inequality by selecting commonly used variables of happiness like:

- age
- gender
- health status
- household size,
- income level
- income inequality
- relative income
- education
- marital status
- number of children
- employment status
- saving status
- house or apartment ownership
- loan

- irregular employment
- perception of high unemployment risk
- within the next two years
- relative living standard
- regional or residing in major city.

Niimi (2016) did not include unemployment as a variable because unemployment in Japan is not a concern. However, this report cannot ignore unemployment because this is a primary concern in South Africa.

Individual happiness may be affected by the individual's characteristics, but some also may be affected by how an individual rate him/herself compared to others. For example, a person may get more satisfaction from an income increment when other people do not get one. In this regard, Van Praag (2011) formulated a theoretical model to argue that subjective well-being (SWB) does not just depend on characteristics of the individual, but on characteristics of the individual's reference group. Although this theoretical model lacked data as it did not report on the effects of the reference mechanism determinant for happiness inequality, it nevertheless forms the foundation for the inclusion as a reference mechanism among happiness inequality determinants. Further studies by Becchetti, et al. (2014) and Niimi (2016) provided such an analysis by including relative income as Van Praag's (2011) relative mechanism determinant, while Niimi included the relative living standard. This paper, however, identifies relatively rich or poor and relatively happy or unhappy as reference mechanism determinants.

2.4 Measurement of Happiness Inequality

Happiness inequality, like other inequality measures, has many facets of measurement. This study used the literature to provide the most appropriate measure. According to Kalmjin and Veenhoven (2005) standard deviation is used by many researchers to measure happiness inequality while researchers in income inequality tend to use Gini coefficient. Their apprehension about using standard deviation as a measure of happiness inequality, Kalmjin and

Veenhoven (2005) prompted them to review all nine descriptive statistics for a measure of happiness inequality.

The descriptive statistics were:

- range
- average deviation from the mean
- variance and its square root the standard deviation
- coefficient of variation
- interquartile range
- mean pair distance
- the Gini coefficient
- Theil's measure of entropy
- percentage outside modus.

The review involved five steps: (1) how happiness of nations is assessed, (2) a statistics dispersion list and considered their underlying assumptions; (3) construction of a hypothetical distributions that cover the notion of inequality; (4) a definition of a criteria of performance and (5) checking how well the step-2 statistics met the step-4 demands when applied to the step-3 hypothetical distributions.

Kalmjin and Veenhoven (2005) analysed the statistics and found that five of the nine statistics (range, Gini coefficient, Theil's measure of entropy, percentage outside modus, and coefficient of variation) did not qualify as a measure of inequality of happiness in nations. Kalmjin and Veenhoven (2005) concluded, therefore, that there is no reason to stop using standard deviation as a measure of happiness inequality.

The review of different happiness inequality literature found that each study provided reasons for its choice of measurement. Veenhoven (1990), used standard deviation since it is the most appropriate measure of spread. Veenhoven (2005) and Clark, et al. (2012) then used Kalmjin and Veenhoven's (2005) reasoning to measure happiness inequality using standard deviation. Niimi

(2016) gratified the use of standard deviation by referring to Frey and Stutzer (2000), Ferrer-i-Carbonell and Frijters (2004), and Clark et al. (2014). The former two found that assuming ordinality or cardinality of happiness scores makes slight alterations to their estimates of the determinants of happiness, while Clark, et al. (2014) found similar results by assuming cardinality and measured happiness inequality using standard deviation, and also measured happiness inequality using the index of ordinal variation, which is a measure of ordinal variables. Van Praag (2011), Clark et al. (2012), Becchetti et al. (2014) and Niimi (2016) assumed cardinality.

Becchetti, et al. (2014) measured happiness inequality using variance, and although they had issues about using the Gini index they continued using the measure as a robust check and found similar findings that are found using the variance. Niimi (2016) also measured happiness inequality using the Gini index as a robust check.

Stevenson and Wolfers (2008) used the variance as a measure of happiness inequality due to the restriction to two parameter distributions as they felt other measures of happiness inequality would be monotonic. Van Praag (2011) measured happiness inequality using the variance (or standard deviation) due to the introduction of reference group mechanism. Gandelman and Porzecanski (2013) measured income inequality and happiness inequality using the Gini index because this allowed them to compare inequality in income, happiness, and utility. Gandelman and Porzecanski (2013: 259) also alluded to the fact that as happiness inequality is new there is not a "large enough body of work to compare and draw conclusions about which standard deviation values imply large or small inequality levels".

Dutta and Foster (2013) contested Kalmijn and Veenhoven's (2005) assumption of cardinality in happiness. By assuming cardinality Kalmijn and Veenhoven (2005) were able to use standard measures of inequality such as standard deviation and the Gini index. For Dutta and Foster (2013) this approach by Kalmijn and Veenhoven was problematic and like other independent studies by Ott (2005), Veenhoven (2005, 2011), Stevenson and Wolfers (2008), Kalmijn (2010),

and Becchetti et al. (2010) they assumed cardinality to enable them to use standard indices, which Dutta and Foster (2013) determined was unsuitable to measure inequality that is ordinal. Instead, they proposed the use of the Allison-Foster method which they admitted had barely been used in the framework of measuring inequality of happiness. Their use of the Allison-Foster method to measure happiness inequality is a median measure of happiness inequality while most studies use standard deviation to measure happiness inequality.

Dutta and Foster's (2013) findings were similar to other studies, and they also used the Gini index as a robust check similar to the studies in the literature that used standard deviation as a measure of happiness inequality. Consequently, this study will measure happiness inequality using standard deviation because Dutta and Foster's (2013) finding using alternative measures remained the same as those that used standard deviation. The use of standard deviation will allow a uniform comparison between the studies (Becchetti, et al. 2014; Niimi, 2016) of developed countries, which is the aim of this study of a developing country.

2.5 South African Literature

This study has found some research literature of happiness inequality globally, but none based on a specific country in Africa. The closest African literature to happiness dispersion has been a comparison of African happiness to subjective global well-being. According to Moller, et al. (2017) Africa is behind in reported happiness globally. The low happiness levels in Africa are due to unfulfilled expectations that were expected with self-governance after independence.

Nonetheless, there has been some research on South African happiness dispersion among races, happiness dispersion is evident between people who differ demographically. Moller (1998) conducted a study of happiness dispersion between African and White demographic groups and found that happiness inequality between both races was high in two periods (or waves) during apartheid. The gap then decreased after the 1994 elections only to increase eighteen months later. It should be noted that while the consecutive findings by Stevenson and Wolfers (2008), Clark,

et al, (2012), and Dutta and Foster (2013) in their studies of happiness dispersion among demographic groups of developed countries showed a decrease in happiness inequality gaps among the demographic groups (in terms of race, gender, education, and age), the South African studies did not look at happiness inequality but differences in happiness between racial groups. Therefore, this present study's objective is to investigate a happiness inequality dispersion across South Africa that might reveal more.

The way happiness is affected by determinants may differ from society to society. Blaauw and Pretorius (2013) investigated determinants of happiness in South Africa and found that some determinants affected happiness differently compared to developed countries. Hinks and Gruen (2007) studied Durban's Quality of Life surveys to ascertain whether happiness determinants affected happiness in South Africa in ways similar to the studies of international happiness. They found some differences. However, such limited research based on one city about happiness determinants does raise the need to further explore a South African happiness inequality study since it may show that other determinants affect happiness inequality differently compared to global studies.

2.6 This Paper's Contribution

As stated above, the cross-country studies of Veenhoven (2005) and Gandelman and Porzecanski (2013) compared happiness inequality between developed countries but did not analyse the trend of happiness inequality and the determinants of happiness inequality of each country. The country-specific studies of developed countries by Stevenson and Wolfers, (2008) Clark et al. (2012), Becchetti et al. (2014) and Niimi (2016) analysed happiness inequality trends and determinants of happiness inequality. The trend analysis studies (Stevenson & Wolfers, 2008; Clark et al. 2012; Becchetti et al. 2014; Niimi, 2016) who have shown a difference in trends between happiness inequality and income inequality (with the exception of Becchetti, et al., 2011). These latter studies are also based on developed countries and therefore do not give a conclusive general trend of happiness inequality and income inequality in developing countries.

This paper, therefore, fills the void in trend analysis by studying the happiness inequality trend of a **developing** country like South Africa.

As alluded to earlier, the determinants of happiness of a developed country may not affect happiness in a similar way to a developing country. Veenhoven's (1990) findings of different properties between the rich and not-so-rich countries further emphasised the need for studies of happiness inequality to be conducted in developing countries. The researcher does not expect determinants of happiness inequality to match across the economic groupings of developed and undeveloped countries. Further, the happiness inequality studies already completed by Becchetti et al., 2014 and Niimi, 2016 have only analysed determinant effects in developed countries on an income threshold where income is an insignificant determinant to happiness. Hence, one would expect income inequality to be an insignificant determinant of happiness inequality. Contrary to this, the aim of this study is to prove income related determinants are significant in a developing country.

The paper, therefore, anticipates the determinants of happiness inequality in a developing country may affect happiness inequality differently. Van Praag's (2011) study was based on a theoretical model which did not provide the effects of the reference mechanism determinant on happiness inequality. This present study, on the other hand, has included and provided an analysis of the effects of the reference mechanism determinant on happiness inequality. South Africa has high unemployment rates, and therefore, unlike Niimi's (2016) study of Japan, this paper has included employment as a determinant, since other variables will play a vital role in happiness inequality. Therefore, this paper is a South African study that analyses the effects of happiness determinants on happiness inequality rather than to compare the difference in happiness between races, unlike previous South African studies.

3. Iinkcukacha kunye nenkqubo-phando/Data and Methodology

3.1 Data and Variables

The research used secondary data collected from the Southern Africa Labour Development Research Unit's (SALDRU's) survey (known as the South African - National Income Dynamics Study (NIDS)). The SALDRU is a School of Economics venture at the University of Cape Town (UCT) which conducts a wide range of research in applied micro-economics with a particular focus on poverty and inequality, labour markets, human capital, and social policy. The NIDS is South Africa's first national household panel study which is a government supported initiative to track and explore issues of poverty. The NIDS survey collects information on:

- changes in poverty and well-being;
- household composition and structure;
- fertility and mortality;
- migration;
- labour market participation and economic activity;
- human capital formation
- health
- education
- vulnerability
- social capital.

Other data covered by the NIDS is about income, education, health, wealth, work life consumption and much more. The survey is conducted every two years, with the commencement of Wave 1 in 2008, followed by Wave 2, 3, and 4 in 2010, 2012 and 2014 respectively.

The NIDS data is at municipality level. Municipality level data comprises 52 municipalities and four waves and has vast data compared to provincial data which is based on nine provinces. This has provided the paper with a possible 208 observations to conduct a trend and determinant analysis of happiness inequality as the study investigated the NIDS data from all four waves.

This paper not only focused on life satisfaction data from the NIDS data to compute national/total happiness inequality data, but also on the national/total income equality data taken from Human Development Report for the trend analysis. The paper first attempted to use NIDS data to calculate income inequality for trend analysis, but the outcome did not show the known fact that income inequality in South Africa is increasing. This researcher then took income inequality data from the Human Development Report since it reflected the known increasing trend. The NIDS surveys were conducted in 2008, 2010, 2012, 2014 and consequently, the study also used income inequality of South Africa for those years from the Human Development Report to correspond to the NIDS waves and enable the study's comparison of income inequality and happiness inequality trends.

Although, the waves are only based on a minimal four biennial studies which makes the year spread of happiness inequality fairly negligible, the NIDS data has the following advantages:

- firstly, happiness data is collected on the same subjects over a period;
- secondly, there are more observations to study;
- thirdly, the data contains all the variables that one needs to conduct a determinants analysis; and
- fourthly, the sample is a representation of South African demographics.

While there was no data collected in South Africa at a national and provincial level on happiness to use for trend and determinant analysis, the NIDS had enough data collected on self-reported happiness. The NIDS data, therefore, did not cover the entire population, but represents a sample of South African demographics as the data was collected in all nine provinces, and in all societies of South Africa. The possible 208 observations give enough data for the paper to gather variables from files for determinants analysis.

The NIDS is based on waves of which each wave has files. This study used STATA to select variables from each file in each wave, and variables that were not selected as possible happiness

inequality variables were dropped. The paper has also merged the files of each wave together as follows:

- adult with HHQuestionnaire to form adult_hhquest;
- adult_hhquest with hhderived to form hhderived_adult_hhquest; and
- hhderived_adult_hhquest and indderived to form indderived_ hhderived_adult_hhquest.

The NIDS also studied the same people (for reduction of the standard error), in a broad range representation of the nation over several years and therefore this data will become a panel study. The variables were sorted into period codes from Waves 1 to 4. This report begins with a total observation of 12 659. The data were cleaned by excluding all observations with irrelevant coding. Some of the observations have the following coding:

- -9 (don't know)
- -8 (refused)
- -5 (not applicable)
- -3 (missing)
- -2 (not asked in phase 2).

The variables with these codes are excluded as they distort data and possibly the paper's analysis. After cleaning the data, the paper is left with 4 372 observations to conduct the trend and determinants analysis. The cleaning of data was not selective or based on certain characteristics of the individuals (i.e. most happy). Instead, observations were excluded based on out-of-range value labels. Thus, there is no issue of attrition causing bias in the data as the data remains random.

This study then followed Becchetti et al.'s (2014) and Niimi's (2016) approach and variables were selected as informed by the happiness literature. Happiness is the dependent variable regressed against the following co-variables:

- age
- gender
- marital status

- education
- health status
- household income
- access to credit
- income inequality
- employment status
- geographic type
- household basic needs (access to running water, access to electricity, access to flushing toilets)
- crime prevalence (theft and burglary, domestic violence, household's violence, gangsterism and murder, shooting and stabbing, and alcohol and drug abuse prevalence)
- reference mechanism determinants (income classification of household: relatively rich and poor)
- race (African and White)
- religious status.

There are two happiness/life satisfaction/subjective well-being questions posed in each wave from the Adult file: **Satisfaction level of life currently (w4_a_wbsat)** and **Level of happiness in comparison to 10 years ago (w4_a_wbsat10yr)**. The questions were:

- What is your current level of life satisfaction between one and ten (one being the least level of satisfaction and ten being the highest level of satisfaction); and
- How happy are you compared to ten years ago?

The ratings of current happiness compared to ten years ago were as follows: happier, the same, less happy, don't know. The correlation between these questions was very low. This means the paper had to choose one appropriate measure between the two questions. The most appropriate measure of happiness inequality is one's current satisfaction with the level of life as it is the general measure of happiness inequality in most literature compared to level of happiness in comparison to ten years ago (Becchetti, et al, 2014; Clark et al. 2012; Dutta & Foster, 2013; Gandelman and Porzecanski, 2013; Niimi, 2016; Stevenson & Wolfers, 2008).

Happiness inequality is measured using standard deviation. According to the literature (Kalmjin & Veenhoven, 2005) standard deviation is a common measure of happiness inequality.

Although, Dutta and Foster (2013) have disputed Kalmjin and Veenhoven's (2005) appraisal of standard deviation, the fact that Dutta and Foster's (2013) measure has hardly been used in happiness inequality and that their findings are similar to studies using standard indices means this paper will follow Kalmjin and Veenhoven's (2005) measurement. This paper has also included weight variables. These variables are included to correct the sample representation in the NIDS data. The paper begins by dropping any individual with 'pweight' (without any weight). The independent variables are defined in detail in Appendix 4.

3.2 Methodology

3.2.1 Happiness analysis

According to Becchetti, et al. (2014) and Niimi, (2016) the happiness inequality research is informed by happiness literature in its selection of happiness inequality determinants. Hence, this paper begins by exploring individual happiness. The weights variable was used to correct for sample representativeness in the NIDS data. This paper then commenced by running a linear survey regression by creating a weighted survey set based on weights, district and cluster. The paper checked the robustness of the linear survey regression by testing for multi-collinearity and 'heteroscedasticity'. Unfortunately, one cannot run these tests on a linear survey regression, instead, a normal linear regression was run. This paper corrects for multi-collinearity by dropping and modifying variables, and heteroscedasticity by running a Robust OLS regression. This individual level regression is the starting point of this paper's analysis.

$$Happiness_i = \beta_1 youth_i + \beta_2 pensioner_i + \beta_3 female_i + \beta_4 In_a_Relationship_i + \beta_5 no_education_i + \beta_6 below_matric_i + \beta_7 abovematric_i + \beta_8 hldes_i + \beta_9 hhsize_i + \beta_{10} hhincome_i + \beta_{11} homeloan_i + \beta_{12} bankloan_i + \beta_{13} microlender_i + \beta_{14} mashonisa_i + \beta_{15} employ_i + \beta_{16} urban_i + \beta_{17} dwellingtype_i + \beta_{18} basic_needs_i + \beta_{19} crimeprevalence_substanceabuse_i + \beta_{20} incomeclass_i + \beta_{21} relatively_happy_i + \beta_{22} relatively_unhappy_i + \beta_{23} Bantu_i + \beta_{24} relnb_i + \beta_{25} religious_i + \beta_{26} dwave2i + \beta_{27} dwave3i + \beta_{28} dwave4_i + \mu_i \ldots (1)$$

The individual Robust OLS regression may be rigged with bias due to unobservable effects. Panel data can control for these unobservable effects and can eliminate the bias in the OLS regression. This paper uses the Robust fixed effect regression to estimate a panel regression. After setting the data into panel form, this study ran a fixed effects regression followed by a random effects regression. A Hausman Test is conducted to choose between a fixed and a random effects regression. When the Hausman Test value is large, the paper rejects the null; and therefore, the fixed effects regression is used for interpretation. The random regression and the Hausman Test may be seen in Appendix 2. The fixed effects regression is used in the results analysis.

$$Happiness_{it} = \beta_1 youth_{it} + \beta_2 pensioner_{it} + \beta_3 In_a_Relationship_{it} + \beta_4 no_education_{it} + \beta_5 below_matric_{it} + \beta_6 abovematric_{it} + \beta_7 hldes_{it} + \beta_8 hhsize_{it} + \beta_9 hhincome_{it} + \beta_{10} homeloan_{it} + \beta_{11} bankloan_{it} + \beta_{12} microlender_{it} + \beta_{13} mashonisa_{it} + \beta_{14} employ_{it} + \beta_{15} urban_{it} + \beta_{16} dwellingtype_{it} + \beta_{17} basic_needs_{it} + \beta_{18} crimeprevalence_substanceabuse_{it} + \beta_{19} incomeclass_{it} + \beta_{20} relatively_happy_{it} + \beta_{21} relatively_unhappy_{it} + \beta_{22} Bantu_{it} + \beta_{23} relnb_{it} + \beta_{24} religious_{it} + \beta_{25} dwave2_{it} + \beta_{26} dwave3_{it} + \beta_{27} dwave4_{it} + \mu_{it} \dots (2)$$

3.2.2 Happiness inequality analysis

To reiterate, self-reported happiness among individuals differs and the difference is referred to as 'happiness inequality'. Self-reported happiness distribution comprises individuals with low happiness and those who have reported higher happiness. The difference between low and high happiness manifests happiness inequality. This paper will run a quantile regression (q = 0.1, 0.25, 0.5, 0.75 and 0.9) using the Robust OLS regression to analyse how determinants affect happiness inequality. This is to establish if a certain determinant increase or decrease happiness at a certain level of happiness leads to an increase or decrease in the difference between low or high happiness levels (happiness inequality).

$$Happiness_{qt} = \beta_1 youth_{qt} + \beta_2 pensioner_{qt} + \beta_3 female_{qt} + \beta_4 In_a_Relationship_{qt} + \beta_5 no_education_{qt} + \beta_6 below_matric_{qt} + \beta_7 abovematric_{qt} + \beta_8 hldes_{qt} + \beta_9 hhsize_{qt} + \beta_{10} hhincome_{qt} + \beta_{11} homeloan_{qt} + \beta_{12} bankloan_{qt} + \beta_{13} microlender_{qt} + \beta_{14} mashonisa_{qt} +$$

$\beta_{15}employ_{qt} + \beta_{16}urban_{qt} + \beta_{17}dwellingtype_{qt} + \beta_{18}basic_needs_{qt} + \beta_{19}crimeprevalence_substanceabuse_{qt} + \beta_{20}incomeclass_{qt} + \beta_{21}relatively_happy_{qt} + \beta_{22}relatively_unhappy_{qt} + \beta_{23}Bantu_{qt} + \beta_{24}relnb_{qt} + \beta_{25}religious_{qt} + \mu_{qt} \ldots (3)$

3.3 Descriptive Analysis

3.3.1 Data analysis

Table 1: Individual happiness summary statistics

Variable	Mean	Std. Dev.
Happiness	5.123113	2.372643
Youth	.3623554	.4806955
Pensioner	.1624543	.3688776
Female	.6651418	.4719544
In a Relationship	.380966	.4856381
No education	.1307182	.3371016
Below matric	.6318047	.4823286
Above matric	.0977813	.2970273
Healthy	.8400046	.3666123
Household size	5.32062	3.346015
Household income	5644.808	12579.14
Home loan	.0205284	.141803
Bank loan	.0444305	.2060554
Micro-lender	.0064616	.0801261
'Mashonisa'	.0135522	.1156255
Employment	.7109707	.453335
Urban	.4796432	.4995997
Dwelling type	.072564	.259427
Basic needs	.4397873	.4963754
Crime prevalence substance abuse	.1699451	.3755953
Income classification	3.548662	.9812851
Relatively happy	.4825023	.499708
Relatively unhappy	.1935613	.3951003
Bantu	.8339433	.3721422
Religion importance	.9223468	.2676328
Religion	.9190874	.2727087

(Source: Author summarised descriptive statistics based on weighted NIDS individual data.)

NIDS happiness data is based on a range of one to ten. The average happiness level in Table 1 is 5, which is mid-level self-reported level of happiness. South Africa is reported as one of the least happy countries in the world and the average level of happiness shown in Table 1 is reflective of

this reported level of happiness. According to Helliwell, et al. (2018) using the Cantril ladder of a scale from zero to ten of 156 countries for the years 2015 to 2017 inclusive ranked South Africa as the 105th happiest country in the world out of 156 countries with a score of 4.724. This ranking was a slight increase from the 2015 and 2016 data where South Africa was ranked 113th and 116th respectively. The lowest ranked countries were mainly poor which may allude to the general notion that most rich countries tend to be happier compared to poor countries. As noted earlier, previous studies of happiness inequality (Becchetti, et al, 2014; and Niimi, 2016) used the happiness literature to select happiness inequality determinants based on developed countries and the literature reflected an average income of between 10 000 yens (Niimi (2016) and 22 000 Euros (Becchetti, et al., 2014). The average household income in Table 1 is 5 664 Rands, which is not high compared to these previous studies (Becchetti, et al., 2014; Niimi, 2016). The average household income reported in Table 1 also confirms that South Africa is a developing country, which substantiates that our analysis is based on a developing country.

South Africa is characterised by low access to credit as reflected in Table 1 where bank loan, home loan, micro lender and 'mashonisa' show 0.04, 0.02, 0.006 and 0.013 averages respectively. The youth makes up approximately 36% of the sample whereas pensioners only make up 16%. Similar to most African countries, South Africa has a young population, hence, it is not surprising to find such an age distribution. It should be noted that 66% of the sample is represented by females which indicates there are more females than males in South Africa. The sample also reflects low education levels as 13% of the sample had no education, while 63% have below matric, whereas only 1% have a qualification above matric.

In terms of health, 84% of the sample reported a healthy status. However, South Africa is characterised by high unemployment, yet Table 1 shows that 71% of the sample's representatives are employed which is not reflective of South Africa's high unemployment challenge. The unemployment misrepresentation in the sample data is understandable, firstly because most individuals in the sample are not economically active (approximately 45%). Secondly, 39% are employed compared to the 16% unemployed. Therefore, when one looks only at the

economically active to ascertain the employment rate the number of individuals who are employed is very high (71%).

Forty-eight percent of the individuals in the sample are urban dwellers. Many emerging countries have high urban populations due to increasing rural-urban migration. South Africa is similar to other emerging economies and it is also characterised by high rural-urban migration. Only 7% of the sample reside in an informal settlement, but 44% have access to water, sanitation and electricity, while 16% reported common occurrence of crime and substance abuse. Sample representatives were requested to classify their household income either at (1) much above average income, (2) above average income, (3) average income, (4) below average income or (5) much below average income. Table 1 shows an income classification mean of three, meaning individuals in the sample generally classified their income to be average.

More people felt happier than ten years ago (48%) compared to those who felt otherwise (19%). The majority of the South African population are Bantu, and this is represented in the sample where 83% of individuals in the surveys were Bantu. South Africa is a religious country and the sample reflects the national figure of 92% who find religion important.

The paper proceeds to examine how the variables vary with time from one survey to another. Happiness decreases from Waves 1 to 2, and gradually increases between Waves 2 and 3 and then increases radically between Waves 3 and 4. The constant increase of the variables from Waves 1 to 4 were for the following:

- education above matric
- household income
- mashonisa
- happy.
- urban population
- basic needs
- relatively

Besides health, happiness increased drastically (between Waves 3 and 4) with the following variables:

- education above matric
- household income
- access to credit
- employment
- urban living
- basic needs
- relatively happy
- religious affinity

Meanwhile the variables (crime prevalence and substance abuse, income classification and relatively unhappy) that would adversely affect happiness decrease in between those two periods. Most of the constant increases within wave periods 3 and 4 can be expected to affect happiness positively, which is why happiness might be increasing drastically in that period. It is interesting to note that during the drastic increase periods income is increasing with increasing happiness. This is reflective of a developing country where income is still a significant determinant of happiness. When 'education below matric' decreases while 'education above matric' increases it indicates that the level of education is gradually improving. Similarly, when 'crime prevalence' constantly decreases, that too can affect happiness positively.

Table 2: Individual happiness per period mean statistics

Variable	Mean			
	Period 1	**Period 2**	**Period 3**	**Period 4**
Happiness	5.34538	4.818618	4.891354	5.4371
Youth	0.367976	0.365039	0.375029	0.342864
Pensioner	0.122141	0.148673	0.172232	0.20677
Female	0.665142	0.665142	0.665142	0.665142
In a Relationship	0.389169	0.378545	0.375801	0.380375
No education	0.129232	0.132662	0.133806	0.127173
Below matric	0.666514	0.641125	0.612534	0.607045
Above matric	0.064273	0.083943	0.109561	0.133349
Healthy	0.792315	0.868253	0.85979	0.839662
Household size	5.349726	5.573193	5.276304	5.083257
Household income	3955.357	5005.754	5843.565	7774.555
Home loan	0.024474	0.019213	0.01807	0.020357
Bank loan	0.033623	0.027447	0.046203	0.070448
Micro lender	0.004346	0.003431	0.005261	0.012809
Mashonisa	0.008234	0.012809	0.01441	0.018756
Employment	0.659345	0.702404	0.698574	0.783195
Urban	0.453797	0.463175	0.493824	0.507777
Dwelling type	0.070677	0.0828	0.061757	0.075023
Basic needs	0.404163	0.422232	0.453339	0.479415
Crime prevalence and substance abuse	0.360247	0.11871	0.102928	0.097896

Income classification	3.60979	3.474154	3.611162	3.499543
Relatively happy	0.432525	0.434355	0.482617	0.580512
Relatively unhappy	0.247941	0.186642	0.1871	0.152562
Bantu	0.833943	0.833943	0.833943	0.833943
Religious importance	0.904392	0.928866	0.919945	0.936185
Religious	0.901189	0.929323	0.912168	0.933669

(Source: Author's variable wave changes based on weighted NIDS wave data.)

3.3.2 Happiness trend analysis

This research does not depart from the initial hypothesis of analysing the trends and effects of determinants on happiness inequality. This study is not about happiness but begins with the analysis of happiness as informed by previous studies of happiness inequality which used the happiness literature to select determinants of happiness inequality. This paper began by analysing the trend between income and happiness to show that this is based on a developing country where happiness rises with increasing income. Happiness decreases from period (Wave) 1 (2008) to period 2 (2010), then gradually increase from periods 2 to 3 (2012) and increases radically from periods 3 to four (2014). Income increases steadily from period 1 to period 3 after which it drastically increases from periods 3 to 4. Although, income does not vary with happiness as shown in Figure 1 (below), the increasing trend of both income and happiness expressed by the trend lines is indicative of a developing country where happiness increases with increasing income. The increasing trend of income and happiness of a developing country confirms several findings from previous studies (particularly Clark, et al., 2008; Frey & Stutzer, 2002; Kenny, 1999; Myers & Diener, 1996). Income increases with increasing happiness clearly between periods 3 and 4 where both happiness and income increase radically.

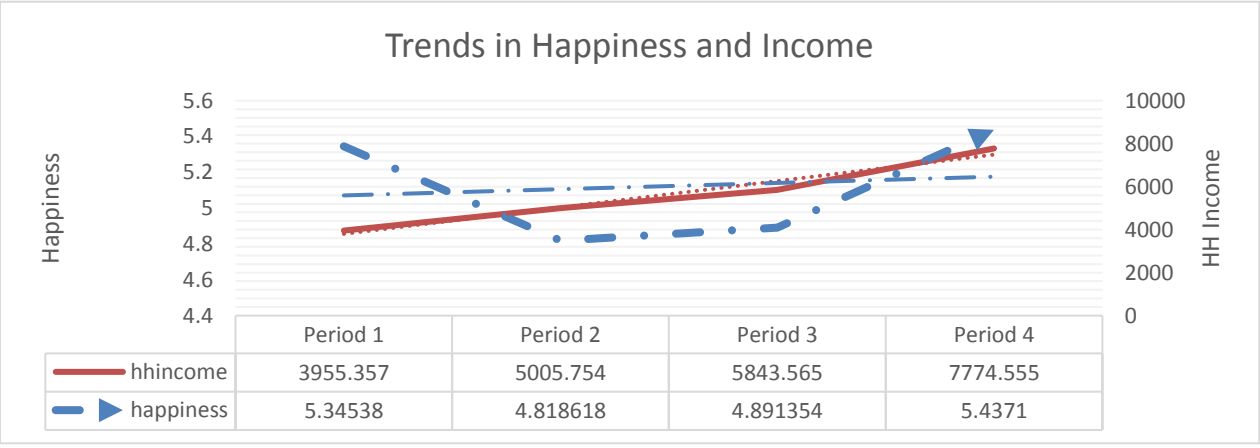


Figure 1: Trends in Happiness and Income

3.3.3 Happiness inequality trend analysis

Total happiness inequality decreases drastically from period one to two, then increases slightly from period two to three, it then decreases drastically from period three to four as depicted in Figure 2 below. Although, there is a slight increase there is a decreasing trend of happiness inequality as reflected by the trend line. The decreasing trend of happiness inequality is in line with previous literature (Niimi, 2016; Stevenson & Wolfers, 2008; Veenhoven, 2005) that have reviewed inequality using happiness inequality. The idea of an alternative measure of inequality was started by Veenhoven (2005) who was sceptical about the claims that inequality has returned in modern society, and he found that inequality has decreased when measured by happiness inequality. Consequently, Stevenson and Wolfers (2008), Clark, et al. (2012), as well as Gandelman and Porzecanski (2013) found that happiness inequality has decreased while income inequality increased. The exception was Becchetti, et al, (2011) who found an increase in both happiness inequality and income inequality in a developed country.

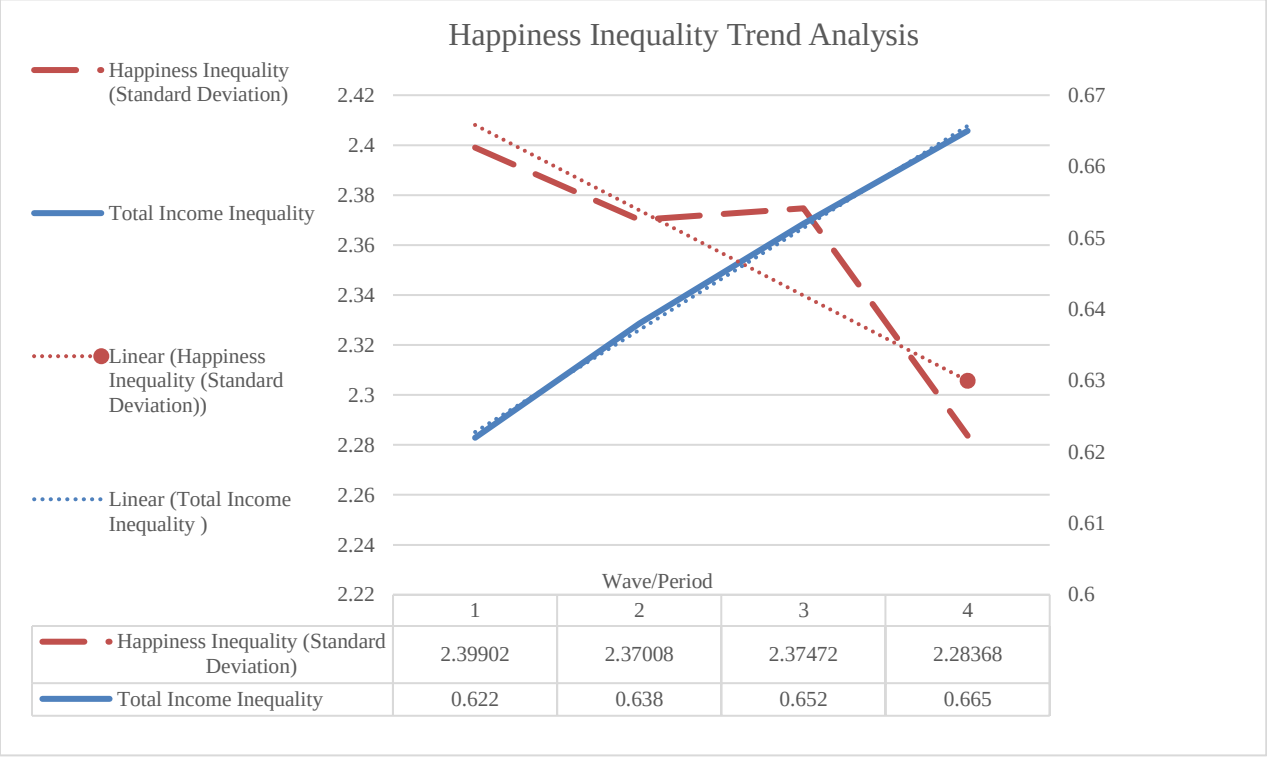


Figure 2: Total Happiness Inequality and total Income Inequality

This report's finding that a decreasing happiness inequality can be measured while an income inequality measure is increasing is contrary to what was postulated: that happiness inequality and income inequality will both increase. In fact, happiness inequality may decrease due to two scenarios:

- the happiness of those who are deemed least happy may improve while happiness of those who are deemed most happy may remain unchanged; and
- the happiness of those who are deemed least happy may remain constant; whereas happiness of those who are considered happiest may deteriorate.

This study on South Africa has found that the former has occurred; happiness of those who were least happy has improved. This has occurred due to the improved lives, living standards, peace, political stability, and freedom and democracy achieved in the democratic South Africa. Significantly, these improvements occurred mainly to those who were viewed as least happy. It is also emphasised by the increase in people who feel relatively happy and a decrease in those who feel relatively unhappy. However, although, this study may lack longer periods of study compared to previous trend studies by others (Becchetti, et al., 2011; Clark, et al., 2012; Gandelman & Porzecanski, 2013; Stevenson & Wolfers 2008,), the finding offers a platform for further studies in developing countries to certify the decreasing happiness inequality trend.

4. Iziphumo neNgxoxo/Results and Discussion

4.1 Determinants Analysis

This paper follows the trend analysis of what determinants of happiness affect happiness and happiness inequality. The paper used the Robust Ordinary Least Squares (OLS) and fixed effect regressions to analyse how determinants of happiness affect happiness. The same happiness determinants have been used to analyse the effects of determinants on happiness inequality since previous literature (Becchetti, et al., 2014: Niimi, 2016) used happiness literature to select determinants for happiness inequality. This paper has defined the concept of happiness inequality as the difference in self-reported happiness among individuals. There are those who will report higher happiness than others whereas others may report lower happiness than others. The effects of determinants of happiness over the subjective well-being distribution will inform the paper whether a certain determinant increase or decreases happiness inequality. The paper used quantile regressions to analyse the effects of determinants on happiness inequality.

4.2 Happiness Determinants Analysis

The study of happiness trends and determinants is important to this paper as it will demonstrate that South Africa, as a developing country, it is characterised by this happiness trend and whether the relationship of determinants is similar to previous studies. The analysis of how determinants affect happiness, were informed by interpreting the results of those variables that were significant on the Robust OLS and fixed effects regressions; and then to compare these to previous South African and international studies. An increase in education above matric, health, household size, employment, access to basic needs, relatively happy, religion and religion importance were found to lead to an increase in happiness, while the following leads to less happiness:

- being a female
- being an urban resident
- having no education
- the prevalence of crime and substance abuse
- relative income classification
- being relatively unhappy
- Being Bantu.

The health status significantly leads to more happiness which confirmed previous findings by Diener (2000) and Frey and Stutzer (2002). The positive relationship between being educated above matric and happiness confirms the findings of Hinks and Gruen (2005) and Mahadea and Rawat (2008). In Hinks and Gruen (2005) being Bantu and female was found to lead to less happiness even though being female is was found to be insignificant in Hinks and Gruen (2005). Mahadea and Rawat (2008) also found a negative relationship between happiness and female and being African.

Household income is insignificant while relative income (income classification) is also significant. The lack of influence of absolute income compared to a great influence of relative income on happiness confirms Posale and Casale's (2010) findings where relative income played a bigger role in determining happiness than absolute income. The income classification variable includes relatively rich and poor people. Subjects of the NIDS data were asked to classify themselves on the income bracket. Those individuals who perceive their household income classification much above average income were given a value label of one (1) and above-average income a value label of two (2). This report classifies these individuals as relatively rich. Meanwhile, those households who perceive their income classification as below average income were given a value label of four (4) and much below average income value label of five (5). This paper classifies these households as relatively poor. Thus, an increase in income classification would mean tilting the scales towards relatively poor. The negative relationship makes sense as an increase in the value label of income classification leads to relatively poor which may lead to less happiness.

The increase in happiness for every additional member in the household may be a testament to the importance of more members in the household to lend a hand within the household or being an extra resource for earnings. The importance of the inclusion of a relative mechanism determinant has been stressed in this study before, which is why the paper includes 'relatively_happy' and 'relatively_unhappy'. Relatively happy includes all people who view their happiness ten years ago above average and relatively unhappy comprises of people who rate their happiness ten years ago below average. It is interesting to see whether people who view themselves as previously happy are currently happy. One would assume that anyone who views his or her previous happiness as below average would report below par current happiness, and such an assumption is confirmed by the negative relationship between relatively unhappy and happiness.

The Bantu variable confirms previous South African studies (Hinks & Gruen, 2005; Mahadea and Rawat, 2008) that have shown that Africans are less happy compared to other race groups. Those who find religion important are also happy, this also confirms previous studies (Clark et al., 2008). Religion brings a sense of comfort and belonging which may positively affect happiness. The Robust OLS regression may be rigged with bias and a way to deal with any prejudices is to run a panel regression. The outcome of the Hausman Test led to the selection of the fixed effects regression and this study uses this regression for panel analysis.

Table 3: Individual Level: dependent variable individual happiness

Dependant Variable: Happiness	**Robust OLS**	**Fixed Regression**
VARIABLES	happiness	happiness
Youth	-0.0161	0.00389
	(0.0513)	**(0.0864)**
Pensioner	0.145	0.160
	(0.111)	(0.0833)
Female	-0.151***	
	(0.0469)	
In a relationship	0.0296	0.0432
	(0.0490)	(0.0327)
No education	-0.235**	-0.238
	(0.102)	(0.157)
Below matric	0.0169	0.0191
	(0.0606)	(0.0699)
Above matric	0.284***	0.271**

	(0.0781)	(0.0776)
Healthy	0.161**	0.174
	(0.0733)	(0.0924)
Household size	0.0203***	0.0174***
	(0.00695)	(0.00208)
Household Income	1.13e-06	1.13e-06
	(1.88e-06)	(9.69e-07)
Home loan	-0.0325	-0.0181
	(0.124)	(0.106)
Bank loan	0.135	0.158
	(0.0840)	(0.0855)
Micro-lender	-0.131	-0.119
	(0.225)	(0.188)
Mashonisa	-0.273	-0.263*
	(0.194)	(0.0935)
Employment	0.131**	0.148**
	(0.0516)	(0.0356)
Urban	-0.165***	-0.171*
	(0.0634)	(0.0655)
Dwelling type	-0.0674	-0.0645
	(0.0814)	(0.0396)
Basic needs	0.358***	0.364**
	(0.0653)	(0.0655)
Crime prevalence substance abuse	-0.299***	-0.302
	(0.0609)	(0.150)
Income classification	-0.289***	-0.291*
	(0.0272)	(0.0926)
Relatively happy	0.872***	0.871***
	(0.0520)	(0.102)
Relatively unhappy	-0.739***	-0.738***
	(0.0605)	(0.0976)
Bantu	-1.040***	-1.035**
	(0.0623)	(0.230)
Religion Importance	0.302***	0.281*
	(0.0925)	(0.0940)
Religious	0.233**	0.193
	(0.0942)	(0.242)
dwave2	-0.642***	
	(0.0646)	
dwave3	-0.660***	
	(0.0615)	
dwave4	-0.204***	
	(0.0636)	
o.dwave2		-
o.dwave3		-
o.dwave4		-
Constant	6.346***	5.925***
	(0.194)	**(0.387)**
Observations	9,440	9,440
R-squared	0.211	0.200
Number of period		4
Mean VIF	1.39	
Heteroscedasticity	chi2(1) = 40.63 Prob > chi2= 0.0000	
Hausman fe re		chi2(24) = (b-B)'[(V_b-V_B)^(-1)](b-B) =423.80 Prob>chi2 = 0.0000

(V_b-V_B is not positive definite)

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

(Source: NIDS individual weighted data.)

The results on the fixed effect regression are quite similarly to the Robust OLS regression with minor differences. The no education, health status, crime prevalence and substance abuse and religion variables are insignificant on the fixed effect while they are significant on the Robust OLS regression, and the Mashonisa variable becomes significant on the fixed effect regression. In addition, being young leads to more happiness in the fixed effect regression compared to less happiness in the Robust OLS regression, but it remains insignificant. Above matric, urban, basic needs, income classification, Bantu and religion importance are less significant in the fixed effect regression. Do determinants affect happiness the same way across all levels of happiness?

4.2 Happiness Inequality Determinant Analysis

This paper has studied individual happiness to show that individual happiness is characterised by a trend and determinants effects that are expected in a developing country. The researcher has also reviewed individual happiness to select variables for happiness inequality similar to some previous literature (Becchetti, et al., 2014; Niimi, 2016) which used happiness literature to select happiness inequality determinants. The researcher used the Robust OLS and fixed effects regressions which are based on mean happiness and such regressions cannot tell whether determinants affect happiness similarly or differently across the happiness distribution, or if these regressions tell us whether a determinant lead to an increase or decrease in happiness inequality. Thus, the researcher uses the quantile regressions to answer these questions.

According to Huang (2016: 2544), "Standard Ordinary least squares (OLS) techniques concentrate on estimating the mean of the dependent variable subject to the values of the

independent variables". The mean is the average happiness level, OLS cannot answer the above question since OLS focuses on one level of happiness. Binder and Coad (2010) further emphasised that the ability of OLS to average happiness distribution means OLS is solely concerned with the 'Average Joe's' happiness. The OLS disregards outliers and thus, cannot give us a holistic picture of how determinants affect happiness at various levels of happiness besides the mean.

People are different because they are affected by different things differently and have distinct levels of happiness. Not all people are pleased by the same things; not all things affect people's happiness the same. For example, some people enjoy or prefer more money than companionship and vice versa. Thus, Binder and Coad (2010) state that, OLS may not give us a holistic picture of happiness, an OLS may under- or overestimate the effects of a determinant on happiness, and it may also fail to spot the importance of the determinant on happiness. The failure of an OLS to go beyond the 'average Joe's' happiness is more apparent in datasets that have heterogeneous individuals. This paper's dataset is heterogeneous as it is based on nine provinces, from four different races, different locations (urban, rural), and households. "Quantile regression techniques can therefore help us obtain a more complete picture of the factors affecting individual well-being" (Binder & Coad; 2010: 6).

From the 10th to the median quantile regressions the paper characterises such individuals as people who reported their happiness lower and from the 75th to the 90th quantile regressions as

those who reported high happiness. Happiness inequality may decrease or increase or remain constant due to the following scenarios:

- an increase in lower happiness (0.1, 0.25 and 0.5) while the higher happiness (0.75 and 0.9) remains unchanged lead to a decrease in happiness inequality
- a decrease in lower happiness (0.1, 0.25 and 0.5) while the higher happiness (0.75 and 0.9) remains unchanged lead to an increase in happiness inequality

- an increase in higher happiness (0.75 and 0.9) while the lower happiness (0.1, 0.25 and 0.5) remains unchanged lead to an increase in happiness inequality
- a decrease in higher happiness (0.75 and 0.9) while the lower happiness (0.1, 0.25 and 0.5) remains unchanged lead to a decrease in happiness inequality
- a uniform decrease or increase in either happiness distributions leads to no change in happiness inequality
- a higher decrease or increase of happiness in lower quantiles (0.1, 0.25, and 0.5) leads to an increase or decrease in happiness inequality respectively
- a higher decrease or increase of happiness in higher quantiles (0.75, and 0.9) leads to a decrease or increase in happiness inequality respectively

Note: The magnitude of the decrease or increase in happiness due to a change in a variable is measured by the level of significance.

The quantile regressions differ from the Robust OLS regression in signs and significance of variables. The variable 'pensioner' is positively significant at the 0.5 quantile regression and leads to a decrease in happiness inequality. The retirement age of 55 to 64 was reported to decrease happiness inequality by Becchetti, et al. (2014) although it was insignificant. There is no predicted reverse U shape as found by Becchetti, et al. (2014) and Niimi (2016). The variable 'female' is less significant on the 25^{th} and median quantiles compared to the Robust OLS and 75^{th} quantile regressions, which may mean women are more marginalised at higher levels of happiness. The higher decrease in happiness distribution found on the 75^{th} quantile regression means that happiness inequality decreases with gender which differs from Becchetti, et al.'s (2014) and Niimi's (2016) findings where gender had no effect on happiness inequality. The variable 'in a relationship' had no effect on the level of happiness distribution meaning it does not change happiness inequality whereas Becchetti, et al. (2014) found a significant positive

relationship between being married and happiness inequality while Niimi (2016) found a negative relationship.

The variable 'no education' is less significant on the 25th (10% level of significance) quantile and more significant on the median quantile (1% level of significance) compared to the Robust OLS regression (5% level of significance) but led to lower happiness at a lower happiness distribution. Thus, 'no education' leads to an increase in happiness inequality.

The variable 'above matric' is significant at 1% confidence interval on the 25th quantile similarly to the Robust OLS regression, but the significance decreases to 10% on the median and 75th quantile regressions. The strong positive significance of education 'above matric' on the lowest level of happiness signifies the importance of education at lower levels of happiness as found by Binder and Coad (2010), although, they found a negative relationship at upper levels of happiness. The higher significance at the lower happiness levels means an 'above matric' qualification leads to less happiness inequality which is similar to the findings of Becchetti, et al. (2014) and Niimi (2016).

Health is more positively significant at the 10th quantile whilst the median quantile's significance is like the Robust OLS regression, but it is not significant on the 25th, 75th and 90th quantiles. One would have expected health to be positively significant at higher levels of happiness; it is understandable why it is significant at the lower levels since access to health and medicine in South Africa has increased especially for poorer households. This increase in happiness at the lower levels means that happiness has improved for the poor while it has remained static for those with comparatively better income levels and higher happiness levels. Hence, health leads to less happiness inequality which is different from Niimi's (2016) study in a developed country which found that health has no effect on happiness inequality

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Household size is also highly significant at the 75th quantile regression similar to the Robust OLS regression. The high positive significance of household size at a higher level of happiness is expected as people at higher levels of happiness are comparatively wealthier and can afford extra household members. Household size, therefore, is a likely driver to increase happiness inequality between rich and poor. However, Niimi's (2016) contrary view is that household size leads to a decrease in happiness inequality in a developed country. Household income is positive and significant at the median level and the 75th level of happiness. One would have then expected that income would play a formidable role at lower levels of happiness. This is contrary to Binder and Coad's (2010) findings where income played a significant role at lower levels of happiness which is what the paper also expected. The magnitude of the significant influence of household income is similar between the lower and higher levels of happiness causing no change to happiness inequality, whilst Becchetti *et al* (2014) and Niimi (2016) found a negative relationship between income and happiness inequality.

Employment is positively significant at 75th quantile regression even though it is less significant than the Robust OLS regression. Hinks and Gruen (2005) found that formal employment leads to more happiness compared to self-employment or temporary employment. Happiness varies with individual social status; the rich are found to be happier. Using that intuition, one would expect people at the 75th quantile to be well-off and employed in the formal sector, which is why employment would derive more significant happiness at that level of happiness distribution. Although an increase in employment *ceteris paribus* (all things remaining the same) might lead to more happiness at the higher happiness level lower levels remain unchanged. This leads to a positive relationship between employment and happiness inequality; meaning that employment is a driver for happiness inequality. This is contrary to Becchetti et al. (2014) who found an insignificant negative relationship in a developed country.

Access to formal credit like bank loan positively affects happiness, such is depicted at the 75th quantile meaning people at this level of happiness have access to such credit. The 10th, 25th, median and 90th quantiles are insignificant similarly to the Robust OLS regression. In terms of a mashonisa loan, which is characterised by high interest rates, harassment and confiscation of personal belongings during the debt payment period, it is expected to lead to less happiness especially for people at lower levels of happiness where people use 'oomashonisa' as a form of credit since such people find it hard to access formal credit markets. Mashonisa is highly significant and negative at the 25th quantile regression confirming the researcher's intuition. The above increase in happiness (bank loan) and decreased in happiness (mashonisa) characterised on the higher and lower levels of happiness respectively, means access to credit leads to more happiness inequality. This is, therefore, similar to the findings of Niimi (2016) in a developed country.

It will be interesting to see if the results adhere to this study's predictions about the income inequality variable. In past papers (Clark, et al., 2012; Becchetti et al., 2014; Niimi, 2016; Stevenson and Wolfers, 2008; Veenhoven, 2005) income inequality had no effect on happiness inequality and this study predicted a different effect for reasons already alluded to. Individuals on the NIDS surveys were asked to rate their income between 'much above average' and 'much below average income. The varying income classifications means income among individuals differed; some reported high income and some reported lower income. This difference in reported income is income inequality, therefore income classification is the study's income inequality variable. Income classification decreases happiness uniformly across all levels of happiness. This means that, similar to previous studies, income inequality does not change happiness inequality contrary to what this paper expected. In addition, relative mechanisms (relatively happy and unhappy), and being Bantu led to no change in happiness inequality. The reference mechanism determinants (relatively rich and poor) also had different outcomes in Becchetti, et al. (2014) and Niimi's (2016) studies in developed countries. Although both papers found a positive relationship between being relatively poor and happiness inequality, the difference was that Niimi (2016) found a positive relationship between happiness inequality and

being relatively rich, whereas Becchetti, et al. (2014) found **no effect** on happiness inequality by being relatively rich.

South Africa is characterised by centralised urban development which causes concentrated rural-urban migration. Some of the people who migrate to the cities end up residing in informal settlements where there is no service delivery and crime is high. Those who end up in this situation are usually poor and one would expect them to be at the lower levels of happiness. The urban, dwelling type, and prevalence of crime and substance abuse adversely affects happiness and they are significant at lower quantiles. These variables lead to higher happiness inequality as happiness at this lower level is decreasing while happiness at higher levels remains constant. The importance of basic needs expressed by the highest level of significance throughout the lower levels of happiness emphasises basic needs are vitally critical for people with lower happiness levels. This necessity confirms Kenny's (1999) argument about the importance of income at the basic level income to meet basic needs.

Religion importance was shown to be less significant at the 25^{th} and 75^{th} quantiles compared to a 1% significance of the Robust OLS regression and 90^{th} quantile. This means the importance of religion leads to an increase in happiness inequality since a significant increase in happiness at the higher level of happiness is greater than that at the lower level of happiness. Meanwhile, religious affiliation is significant at the 5% confidence interval on the 10^{th} quantile, at 10% interval on the 25^{th} quantile, and at 1% on the median quantiles compared to the 5% confidence interval on the Robust OLS regression. Religious affiliation, therefore, leads to less happiness inequality as happiness at lower levels increases while happiness at high levels of happiness remains unchanged. The researcher then postulates that people at higher levels of happiness distribution value religion, but the religious affiliation does not affect their happiness.

Table 4: Happiness Inequality Regressions; dependant variable Happiness Inequality

Quantiles	**0.1**	**0.25**	**0.5**	**0.75**	**0.9**
VARIABLES	happiness	happiness	happiness	happiness	happiness
Youth	-0.0280	-0.0525	-0.0354	0.0781	-0.0428
	(0.0879)	(0.0755)	(0.0555)	(0.0791)	(0.113)
Pensioner	0.0784	0.0261	0.197*	0.142	0.285
	(0.188)	(0.161)	(0.119)	(0.169)	(0.241)
Female	-0.113	-0.136**	-0.101**	-0.238***	-0.142
	(0.0804)	(0.0691)	(0.0508)	(0.0724)	(0.103)
In a relationship	0.114	0.102	0.0169	0.0125	0.0410
	(0.0828)	(0.0711)	(0.0523)	(0.0745)	(0.106)
No education	-0.233	-0.293*	-0.318***	-0.0869	-0.256
	(0.179)	(0.154)	(0.113)	(0.161)	(0.230)
Below matric	-0.0806	-0.0777	-0.00766	0.139	0.0859
	(0.105)	(0.0904)	(0.0664)	(0.0947)	(0.135)
Above matric	0.250*	0.433***	0.143*	0.219*	0.207
	(0.135)	(0.116)	(0.0854)	(0.122)	(0.174)
healthy	0.416***	0.120	0.163**	0.132	-0.233
	(0.122)	(0.105)	(0.0770)	(0.110)	(0.157)
House hold size	0.00734	0.00988	0.0115	0.0327***	0.0174
	(0.0119)	(0.0102)	(0.00749)	(0.0107)	(0.0152)
Household income	7.48e-07	-5.97e-07	2.88e-06*	4.21e-06*	-1.72e-07
	(2.46e-06)	(2.11e-06)	(1.55e-06)	(2.21e-06)	(3.15e-06)
Home loan	-0.152	0.0605	0.00432	-0.244	-0.153
	(0.216)	(0.185)	(0.136)	(0.194)	(0.277)
Bank loan	0.213	0.0848	0.129	0.248*	0.0497
	(0.145)	(0.124)	(0.0914)	(0.130)	(0.186)
microlender	-0.139	0.0882	0.0676	-0.0827	-0.870
	(0.417)	(0.358)	(0.263)	(0.375)	(0.535)
Mashonisa	-0.460	-0.668**	-0.292	-0.0632	-0.553
	(0.316)	(0.272)	(0.200)	(0.285)	(0.406)
Employment	0.0891	0.0955	0.0377	0.150*	0.155
	(0.0886)	(0.0761)	(0.0559)	(0.0798)	(0.114)
Urban	-0.187*	-0.178*	-0.128*	-0.107	-0.195
	(0.107)	(0.0919)	(0.0675)	(0.0963)	(0.137)
Dwelling type	-0.0195	-0.195*	-0.235***	-0.0786	0.150
	(0.138)	(0.118)	(0.0868)	(0.124)	(0.177)
Basic needs	0.333***	0.320***	0.269***	0.459***	0.311**
	(0.109)	(0.0937)	(0.0688)	(0.0982)	(0.140)
Crime prevalence substance abuse	-0.469***	-0.223***	-0.0820	-0.0394	-0.0136
	(0.0971)	(0.0833)	(0.0613)	(0.0874)	(0.125)
Income classification	-0.118***	-0.271***	-0.419***	-0.415***	-0.365***
	(0.0428)	(0.0367)	(0.0270)	(0.0385)	(0.0549)
Relatively happy	0.634***	0.771***	0.884***	1.206***	1.326***
	(0.0877)	(0.0752)	(0.0553)	(0.0789)	(0.112)
Relatively unhappy	-0.505***	-0.691***	-0.661***	-0.782***	-0.873***
	(0.111)	(0.0954)	(0.0701)	(0.1000)	(0.143)
Bantu	-1.287***	-1.032***	-1.114***	-0.949***	-0.946***
	(0.105)	(0.0904)	(0.0665)	(0.0948)	(0.135)
Religion importance	0.254	0.317**	0.101	0.288**	0.603***
	(0.161)	(0.139)	(0.102)	(0.145)	(0.207)
Religious	0.315**	0.261*	0.422***	0.224	-0.0553
	(0.159)	(0.137)	(0.101)	(0.144)	(0.205)
Constant	2.876***	4.668***	6.550***	7.301***	9.102***
	(0.326)	(0.280)	(0.206)	(0.293)	(0.418)
Observations	9,440	9,440	9,440	9,440	9,440
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1				

(Source: Individual level regressions from weighted NIDS data.)

5. Ushwankathelo/Conclusion

The paper has had two investigations to make; firstly, **how does happiness inequality trend compared to income inequality**, and secondly, **how do happiness inequality determinants affect happiness inequality?** The trend analysis is important as there is a growing view that inequality cannot be measured in income inequality only. This has raised the question whether global inequality is increasing when measured by a different measure besides income inequality.

Past studies find that inequality decreases if measured in happiness inequality and as such they fortify the argument of an alternative or a supplementary measure of inequality. Therefore, studies of happiness in the literature studies average happiness do not tell the whole picture about average happiness. One also needs to find out how determinants of happiness affect happiness at different happiness distributions as all results show that determinants do not affect happiness in similar ways across all happiness distributions. If, that is the case this study was motivated to research how determinants affect happiness inequality using the quantile regression.

The view that is trending of total happiness inequality and income inequality (as depicted in Figure 2 above) shows that total happiness inequality is decreasing, while income inequality is increasing. This differs to what this paper postulates and the findings are in line with the findings of most previous studies. The dominant trend from previous papers was of a decreasing happiness inequality and an increasing income inequality with the exception of one study that found an increase in both income inequality and happiness inequality. What this study finds, in line with previous studies, is that the difference in trends between happiness inequality and income inequality may mean that this is not only a developed country phenomenon. This means that happiness inequality may be a supplement measure of inequality together with income inequality since happiness inequality is decreasing. In addition, this paper's findings are based on only four years of survey and therefore they may be limited. It is possible that a longer period of data might show a different trend. Since there is no national happiness survey that includes the

entire population in South Africa, this paper recommends that the population census also includes questions on subjective well-being.

An OLS regressions focus on average happiness, yet happiness varies from person to person. Furthermore, the OLS regression does not take into account the fact that different levels of happiness may not be affected by determinants for an average level of happiness in a similar way; the regression only shows how determinants affect average happiness. The inadequacy of an OLS to show how determinants affect outliers' happiness can be observed more in this study's diverse dataset. The quantile regressions used have also shown that determinants of happiness affect happiness differently at various levels of subjective well-being and this justify the need to study how variables affect happiness inequality.

Some of the results shown in this paper are different from those of Becchetti, et al. (2014) and Niimi (2016) for developed countries, while some findings are similar to these studies. The significant observation of this paper is the relationship between income inequality and happiness inequality. Previous studies found no relationship between income inequality and happiness inequality such a conclusion is expected from studies based on developed countries. The researcher, however, did not expect to find the same effect of income inequality on happiness inequality for a developing country like South Africa.

The paper's findings propose to improve happiness inequality for South Africa as follows:

- No education leads to less happiness at lower levels of happiness, while an education above matric leads to more happiness at lower levels of happiness.
- No education also leads to an increase in happiness inequality, while an education above matric leads to a decrease in happiness inequality. Therefore, in terms of South Africa, this study proposes an increase in education especially for people at lower levels of happiness for less happiness inequality.

- The finding of a decrease in happiness inequality with an increase in health means there should be an improvement in access to health.
- Access to credit for the people at the lower level of happiness should be improved to decrease happiness inequality.
- Employment for people at lower levels of happiness should also improve to increase their happiness levels and thereby decrease happiness inequality.
- Decentralisation of development nodes in South Africa may help to address the increase in happiness inequality caused by the rise of informal settlements in urban areas with inadequate dwellings, amid the prevalence of crime and substance abuse

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Appendix 1: OLS Robustness tests

Variable	VIF	1/VIF
below_matric	2.34	0.427352
basic_needs	2.17	0.461715
urban	2.06	0.484626
matric	1.91	0.523099
dwave4	1.70	0.588058
no_education	1.69	0.591875
dwave3	1.62	0.617204
dwave2	1.55	0.644374
relat~_happy	1.41	0.709691
religious	1.41	0.711368
youth	1.38	0.724914
relnb	1.38	0.726482
relat~nhappy	1.36	0.737607
In_a_Relat~p	1.22	0.819719
Bantu	1.21	0.823250
incomeclass	1.19	0.840983
employ	1.16	0.860382
homeloan	1.15	0.868326
hhincome	1.14	0.878624
crimepreva~e	1.14	0.879641
dwellingtype	1.12	0.890614
female	1.12	0.894111
hhsize	1.11	0.896868
hldes	1.10	0.909846
pensioner	1.10	0.910711
bankloan	1.09	0.914374
mashonisa	1.01	0.988464
microlender	1.01	0.990825
Mean VIF	1.39	

VIF<10: there is no multicollinearity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of happiness

chi2(1) = 40.63

Prob > chi2 = 0.0000

p-value less than 0.05 so we can reject the H0: no heteroscedasticity in data. Therefore, there is heteroscedasticity. Solve by Robust use.

Appendix 2: **Random effects and Hausman Test**

```
. ***random effects

. xtreg happiness youth pensioner female In_a_Relationship no_education below_matric abovematric
hldes hhsize hhincome homeloan bankloan microlender mashonisa employ urban dwellingtype
basic_needs crimeprevalence_substanceabuse incomeclass relatively_happy relatively_unhappy Bantu
relnb religious dwave2 dwave3 dwave4,re

Random-effects GLS regression                   Number of obs      =      9440
Group variable: period                          Number of groups   =         4
R-sq:  within  = 0.2008                         Obs per group: min =      2011
       between = 1.0000                                        avg =    2360.0
       overall = 0.2108                                        max =      2523
                                                Wald chi2(28)      =   2513.22
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

happiness	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
youth	-.0161095	.0510772	-0.32	0.752	-.1162188	.0839999
pensioner	.1451133	.1091349	1.33	0.184	-.0687871	.3590137
female	-.1511535	.0467253	-3.23	0.001	-.2427334	-.0595736
In_a_Relationship	.0296366	.0483091	0.61	0.540	-.0650475	.1243206
no_education	-.2348697	.1038426	-2.26	0.024	-.4383975	-.0313419
below_matric	.0168988	.0611269	0.28	0.782	-.1029077	.1367054
abovematric	.2842171	.0786182	3.62	0.000	.1301283	.4383058
hldes	.1610572	.071233	2.26	0.024	.0214431	.3006713
hhsize	.0203286	.0068924	2.95	0.003	.0068197	.0338375
hhincome	1.13e-06	1.43e-06	0.79	0.431	-1.68e-06	3.93e-06
homeloan	-.0325133	.1255667	-0.26	0.796	-.2786195	.2135928
bankloan	.1353434	.0842622	1.61	0.108	-.0298074	.3004942
microlender	-.1307072	.241952	-0.54	0.589	-.6049243	.3435099
mashonisa	-.2728581	.1836767	-1.49	0.137	-.6328579	.0871416
employ	.13149	.0515662	2.55	0.011	.0304222	.2325578
urban	-.1647481	.0621814	-2.65	0.008	-.2866214	-.0428748
dwellingtype	-.0673816	.0799284	-0.84	0.399	-.2240383	.0892752
basic_needs	.3580655	.0633624	5.65	0.000	.2338774	.4822536
crimeprevalence_substanceabuse	-.2992167	.0592616	-5.05	0.000	-.4153673	-.1830661
incomeclass	-.2892741	.0248499	-11.64	0.000	-.3379789	-.2405693
relatively_happy	.8722625	.0511138	17.07	0.000	.7720812	.9724437
relatively_unhappy	-.7391807	.0646298	-11.44	0.000	-.8658527	-.6125086
Bantu	-1.039967	.0613262	-16.96	0.000	-1.160164	-.9197696
relnb	.3018305	.0937721	3.22	0.001	.1180406	.4856205
religious	.232829	.0926315	2.51	0.012	.0512746	.4143833
dwave2	-.6419305	.0654825	-9.80	0.000	-.7702738	-.5135873
dwave3	-.6599926	.0627274	-10.52	0.000	-.782936	-.5370492
dwave4	-.2041703	.0634217	-3.22	0.001	-.3284745	-.0798661
_cons	6.346419	.1916287	33.12	0.000	5.970833	6.722004
sigma_u	0					
sigma_e	2.091121					
rho	0	(fraction of variance due to u_i)				

```
Hausman fe re
```

chi2(23) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= -10.56 chi2<0 ==> model fitted on these

data fails to meet the asymptoticassumptions of the Hausman test;see suest for a generalized test

Breusch and Pagan Lagrangian multiplier test for random effects

happiness[period,t] = Xb + u[period] + e[period,t]

Estimated results:

| Var sd = sqrt(Var)

---+---

happiness | 5.524108 2.350342

e | 4.372787 2.091121

u | 0 0

Test: Var(u) = 0

chibar2(01) = 0.00

Prob > chibar2 = 1.0000

Appendix 3: Quantile regressions

```
. *Quantile regressions for 10th, 25th, 50th, 75th and 90th quantiles

. qreg happiness youth pensioner female In_a_Relationship no_education below_matric
abovematric hldes hhsize hhincome homeloan bankloan microlender mashonisa employ urban
dwellingtype basic_needs crimeprevalence_substanceabuse incomeclass relatively_happy
relatively_unhappy Bantu relnb religious,quantile (0.1)

.1 Quantile regression                          Number of obs =      9440

  Raw sum of deviations     7229 (about 2)

  Min sum of deviations 6652.562                Pseudo R2     =    0.0797
```

happiness	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
youth	-.0280181	.0879087	-0.32	0.750	-.2003382	.1443021
pensioner	.0783932	.1879645	0.42	0.677	-.2900578	.4468442
female	-.1127284	.0804329	-1.40	0.161	-.2703944	.0449375
In_a_Relationship	.1143647	.0828433	1.38	0.167	-.0480261	.2767555
no_education	-.2331407	.1788292	-1.30	0.192	-.5836847	.1174032
below_matric	-.0806238	.1052484	-0.77	0.444	-.2869335	.1256859
abovematric	.2496237	.1352665	1.85	0.065	-.0155277	.5147752
hldes	.4158047	.1220522	3.41	0.001	.176556	.6550534
hhsize	.0073433	.011867	0.62	0.536	-.0159185	.0306051
hhincome	7.48e-07	2.46e-06	0.30	0.761	-4.07e-06	5.56e-06
homeloan	-.1524143	.2158151	-0.71	0.480	-.5754585	.2706298
bankloan	.2127713	.1448026	1.47	0.142	-.071073	.4966157
microlender	-.138909	.4165479	-0.33	0.739	-.9554328	.6776148
mashonisa	-.4597184	.3162692	-1.45	0.146	-1.079674	.1602375
employ	.0891344	.0886228	1.01	0.315	-.0845855	.2628543
urban	-.1871927	.1070161	-1.75	0.080	-.3969673	.0225819
dwellingtype	-.0195127	.1375352	-0.14	0.887	-.2891115	.2500861
basic_needs	.3330082	.1090843	3.05	0.002	.1191794	.5468369
crimeprevalence_substanceabuse	-.468837	.0970748	-4.83	0.000	-.6591246	-.2785494
incomeclass	-.1177907	.0427694	-2.75	0.006	-.201628	-.0339534
relatively_happy	.6342892	.0876505	7.24	0.000	.4624754	.8061031
relatively_unhappy	-.5046291	.1111009	-4.54	0.000	-.7224108	-.2868474
Bantu	-1.286679	.1053437	-12.21	0.000	-1.493175	-1.080183
relnb	.2539357	.1614988	1.57	0.116	-.0626368	.5705082
religious	.3147906	.1594933	1.97	0.048	.0021492	.627432
_cons	2.875933	.3260408	8.82	0.000	2.236823	3.515044

.

qreg happiness youth pensioner female In_a_Relationship no_education below_matric abovematric hldeshhsize hhincome homeloan bankloan microlender mashonisa employ urban dwellingtype basic_needs crimeprevalence_substanceabuse incomeclass relatively_happy relatively_unhappy Bantu relnb religious, quantile (.25)

.25 Quantile regression — Number of obs = 9440

Raw sum of deviations 13810.5 (about 4)

Min sum of deviations 12321.11 — Pseudo R2 = 0.1078

happiness	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
youth	-.0525367	.0754709	-0.70	0.486	-.200476	.0954026
pensioner	.0260554	.1613702	0.16	0.872	-.2902651	.3423759
female	-.1364817	.0690528	-1.98	0.048	-.2718402	-.0011232
In_a_Relationship	.102004	.0711222	1.43	0.152	-.0374108	.2414188
no_education	-.2929709	.1535275	-1.91	0.056	-.5939179	.0079761
below_matric	-.0776761	.0903573	-0.86	0.390	-.254796	.0994437
abovematric	.4331798	.1161282	3.73	0.000	.2055434	.6608162
hldes	.1197274	.1047836	1.14	0.253	-.085671	.3251259
hhsize	.009883	.010188	0.97	0.332	-.0100876	.0298536
hhincome	-5.97e-07	2.11e-06	-0.28	0.777	-4.73e-06	3.54e-06
homeloan	.0604818	.1852804	0.33	0.744	-.3027077	.4236714
bankloan	.084768	.1243151	0.68	0.495	-.1589165	.3284524
microlender	.0881956	.3576124	0.25	0.805	-.6128019	.7891931
mashonisa	-.6683721	.2715216	-2.46	0.014	-1.200613	-.136131
employ	.0955061	.076084	1.26	0.209	-.0536349	.2446472
urban	-.1775603	.0918748	-1.93	0.053	-.3576548	.0025343
dwellingtype	-.1945751	.118076	-1.65	0.099	-.4260295	.0368794
basic_needs	.3201678	.0936504	3.42	0.001	.1365927	.5037428
crimeprevalence_substanceabuse	-.2231582	.0833401	-2.68	0.007	-.3865229	-.0597936
incomeclass	-.271102	.0367182	-7.38	0.000	-.3430775	-.1991264
relatively_happy	.7705968	.0752492	10.24	0.000	.6230922	.9181015
relatively_unhappy	-.6909488	.0953817	-7.24	0.000	-.8779175	-.5039801
Bantu	-1.031605	.0904391	-11.41	0.000	-1.208885	-.8543251
relnb	.3169276	.138649	2.29	0.022	.0451456	.5887097
religious	.2605616	.1369273	1.90	0.057	-.0078456	.5289688
_cons	4.667645	.2799107	16.68	0.000	4.11896	5.216331

. qreg happiness youth pensioner female In_a_Relationship no_education below_matric abovematric hldes hhsize hhincome homeloan bankloan microlender mashonisa employ urban

dwellingtype basic_needs crimeprevalence_substanceabuse incomeclass relatively_happy relatively_unhappy Bantu relnb religious

Median regression Number of obs = 9440

Raw sum of deviations 17531 (about 5)

Min sum of deviations 15697.61 Pseudo R2 = 0.1046

happiness	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
youth	-.0353848	.055472	-0.64	0.524	-.144122	.0733524
pensioner	.1971597	.1186091	1.66	0.096	-.0353397	.4296591
female	-.1005669	.0507547	-1.98	0.048	-.200057	-.0010768
In_a_Relationship	.0169236	.0522757	0.32	0.746	-.085548	.1193952
no_education	-.3181427	.1128445	-2.82	0.005	-.5393424	-.096943
below_matric	-.0076564	.0664137	-0.12	0.908	-.1378416	.1225288
abovematric	.1433108	.0853556	1.68	0.093	-.0240047	.3106263
hldes	.1632418	.0770172	2.12	0.034	.0122715	.3142121
hhsize	.0115257	.0074883	1.54	0.124	-.0031529	.0262044
hhincome	2.88e-06	1.55e-06	1.86	0.063	-1.54e-07	5.92e-06
homeloan	.0043239	.1361833	0.03	0.975	-.2626247	.2712726
bankloan	.1285186	.0913731	1.41	0.160	-.0505924	.3076296
microlender	.067582	.2628494	0.26	0.797	-.4476596	.5828236
mashonisa	-.2924056	.1995717	-1.47	0.143	-.6836092	.098798
employ	.0377195	.0559226	0.67	0.500	-.071901	.1473399
urban	-.1277596	.0675291	-1.89	0.059	-.2601313	.004612
dwellingtype	-.2349599	.0867873	-2.71	0.007	-.4050817	-.0648381
basic_needs	.2687214	.0688342	3.90	0.000	.1337916	.4036513
crimeprevalence_substanceabuse	-.0820215	.061256	-1.34	0.181	-.2020965	.0380535
incomeclass	-.4189522	.0269883	-15.52	0.000	-.471855	-.3660493
relatively_happy	.8841246	.0553091	15.99	0.000	.7757069	.9925423
relatively_unhappy	-.6608855	.0701067	-9.43	0.000	-.7983098	-.5234613
Bantu	-1.114472	.0664738	-16.77	0.000	-1.244775	-.9841691
relnb	.1009316	.1019087	0.99	0.322	-.0988314	.3006947
religious	.421575	.1006432	4.19	0.000	.2242925	.6188574
_cons	6.549572	.2057378	31.83	0.000	6.146281	6.952862

. qreg happiness youth pensioner female In_a_Relationship no_education below_matric abovematric hldes hhsize hhincome homeloan bankloan microlender mashonisa employ urban dwellingtype basic_needs crimeprevalence_substanceabuse incomeclass relatively_happy relatively_unhappy Bantu relnb religious, quantile (.75)

.75 Quantile regression Number of obs = 9440

Raw sum of deviations 14787.5 (about 7)

Min sum of deviations 12962.43 Pseudo R2 = 0.1234

happiness	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
youth	.0780616	.0791083	0.99	0.324	-.0770079	.233131
pensioner	.1417931	.1691476	0.84	0.402	-.1897728	.473359
female	-.2376669	.0723809	-3.28	0.001	-.3795492	-.0957847
In_a_Relationship	.0125202	.07455	0.17	0.867	-.1336138	.1586543
no_education	-.0869225	.1609269	-0.54	0.589	-.402374	.228529
below_matric	.1391912	.0947122	1.47	0.142	-.0464652	.3248475
abovematric	.2191928	.1217251	1.80	0.072	-.0194147	.4578003
hldes	.1315732	.1098337	1.20	0.231	-.0837247	.346871
hhsize	.0327069	.010679	3.06	0.002	.0117738	.05364
hhincome	4.21e-06	2.21e-06	1.91	0.057	-1.22e-07	8.54e-06
homeloan	-.2436066	.1942101	-1.25	0.210	-.6243004	.1370872
bankloan	.2484843	.1303066	1.91	0.057	-.0069448	.5039134
microlender	-.0826632	.3748479	-0.22	0.825	-.817446	.6521196
mashonisa	-.0632104	.2846079	-0.22	0.824	-.6211034	.4946826
employ	.1498218	.0797509	1.88	0.060	-.0065073	.3061508
urban	-.1067405	.0963029	-1.11	0.268	-.2955149	.0820339
dwellingtype	-.0786394	.1237668	-0.64	0.525	-.321249	.1639703
basic_needs	.4592708	.098164	4.68	0.000	.2668481	.6516934
crimeprevalence_substanceabuse	-.0393557	.0873568	-0.45	0.652	-.2105939	.1318825
incomeclass	-.4153248	.0384878	-10.79	0.000	-.4907693	-.3398804
relatively_happy	1.206337	.0788759	15.29	0.000	1.051723	1.36095
relatively_unhappy	-.7819589	.0999787	-7.82	0.000	-.9779388	-.585979
Bantu	-.9490519	.0947979	-10.01	0.000	-1.134876	-.7632276
relnb	.2880711	.1453314	1.98	0.047	.0031902	.5729519
religious	.2241857	.1435267	1.56	0.118	-.0571576	.5055291
_cons	7.300529	.2934013	24.88	0.000	6.725399	7.875659

. qreg happiness youth pensioner female In_a_Relationship no_education below_matric abovematric hldes hhsize hhincome homeloan bankloan microlender mashonisa employ urban dwellingtype basic_needs crimeprevalence_substanceabuse incomeclass relatively_happy relatively_unhappy Bantu relnb religious, quantile (.9)

.9 Quantile regression Number of obs = 9440

Raw sum of deviations 8253 (about 8)

Min sum of deviations 7290.712 Pseudo R2 = 0.1166

happiness	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
youth	-.0427635	.1128283	-0.38	0.705	-.2639314	.1784043
pensioner	.2852028	.2412469	1.18	0.237	-.1876933	.7580989
female	-.1420016	.1032333	-1.38	0.169	-.3443612	.060358
In_a_Relationship	.041024	.106327	0.39	0.700	-.1673998	.2494478
no_education	-.256235	.2295221	-1.12	0.264	-.7061478	.1936779
below_matric	.085947	.1350833	0.64	0.525	-.1788454	.3507395
abovematric	.2071712	.1736105	1.19	0.233	-.133143	.5474853
hldes	-.2326007	.1566504	-1.48	0.138	-.5396694	.0744679
hhsize	.0173953	.0152309	1.14	0.253	-.0124606	.0472511
hhincome	-1.72e-07	3.15e-06	-0.05	0.956	-6.35e-06	6.01e-06
homeloan	-.1530403	.2769923	-0.55	0.581	-.696005	.3899245
bankloan	.0496699	.1858499	0.27	0.789	-.314636	.4139758
microlender	-.8695744	.534627	-1.63	0.104	-1.917559	.1784099
mashonisa	-.5532066	.4059222	-1.36	0.173	-1.348902	.2424886
employ	.1552408	.1137448	1.36	0.172	-.0677236	.3782052
urban	-.195171	.137352	-1.42	0.155	-.4644105	.0740686
dwellingtype	.1501348	.1765224	0.85	0.395	-.1958873	.496157
basic_needs	.3112354	.1400065	2.22	0.026	.0367925	.5856783
crimeprevalence_substanceabuse	-.0135641	.1245927	-0.11	0.913	-.2577927	.2306645
incomeclass	-.3648562	.0548933	-6.65	0.000	-.4724589	-.2572535
relatively_happy	1.326029	.1124968	11.79	0.000	1.105511	1.546547
relatively_unhappy	-.8727061	.1425947	-6.12	0.000	-1.152222	-.5931897
Bantu	-.945663	.1352055	-6.99	0.000	-1.210695	-.680631
relnb	.602744	.2072789	2.91	0.004	.1964325	1.009055
religious	-.055343	.204705	-0.27	0.787	-.456609	.3459231
_cons	9.102391	.4184638	21.75	0.000	8.282112	9.922671

Appendix 4: Variable Description

Individual
Age is in years varying from 0 to 85^{+} years. **Youth**: A dummy of 1 for individuals with age between 20 and 34, and 0 otherwise. **Pensioner: A** dummy of all people with age 60 and above, and 0 otherwise.
Female: Female has a value label of two, thus, the paper has created a dummy of one for female where best gender is equal to two, and zero otherwise.
In a relationship: There is a dummy of 1 for **in a relationship ((married or living with partner) individuals**, and zero otherwise.
No education: A dummy of 1 for individuals with zero years of education and no schooling, and 0 otherwise. **Below matric**: A dummy of 1 for individuals with less than 12 years of education, and 0 otherwise **Above matric**: A dummy of 1 for individuals with more than 12 years of education, and 0 otherwise
Health: The paper has created **a dummy of 1 for all healthy individuals, and 0 otherwise.** Value label one: excellent perceived health status, two: very good perceived health status, three: good perceived health status, four: fair perceived health status and five: poor perceived health status.
Household size gives the number of household residents
Household income monthly income full imputation
Loans: There are different forms of loans. The paper has focused on the predominant ones; home loans, personal bank loans, micro-lender, and mashonisa. There are two value labels (two or one) of each category of loans. Value label two is no and value label one is yes. The paper has created **a dummy of one if a person has a loan**, and zero otherwise.
Employment: The paper has a dummy of 1 for an employed individual (narrow employed), and 0 otherwise (**actively seeking employment but remain unemployed).**
Urban: A dummy of 1 for individuals who reside in an urban area, and 0 otherwise.
Dwelling type: The paper has **a dummy of 1 for those households who reside in informal settlements, and 0 otherwise.**
Basic needs: A dummy of 1 for individuals who have access to these basic needs: access to running water, flushing toilets and electricity, and 0 otherwise.
Crime prevalence and substance abuse: The paper has created **a dummy of one for common: fairly and very common** and zero for not common: never happens, very rare, not common.
Reference Mechanism Determinants **Income Classification**: Includes individuals who classify their average income as: much above average income (1), above average income (2), average income (3), below average income (4) and much below above average income (5). **Relatively happy: A dummy of 1 for** those who perceive themselves to be happier than ten years ago, and 0 otherwise. **Relatively unhappy: A dummy of 1 for** those who perceive themselves to be less happy than ten years ago, and 0 otherwise.
Bantu: The paper has **a dummy of 1 for Africans**, and zero otherwise.

Religion importance: The paper has **a dummy of 1 for people who value religion whether important or very important, and 0 otherwise.**

Religion: The paper has created a dummy **of 1 for individuals with religious affiliation, and 0 otherwise.**