



# Socio-Economic Inequality of Wellbeing: A Comparison of Switzerland and South Africa

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## Abstract

The study seeks answers to the broader question on the income-wellbeing nexus through a seldom utilised technique of concentration index to measure income related wellbeing inequality. The analysis is undertaken in the vastly differing income and income inequality contexts of Switzerland and South Africa to contrast the relationships in different scenarios over a 10-year period. The study brings forth the findings that wellbeing is concentrated among the higher end of the income distribution in both countries but that the level of wellbeing concentration is lower in Switzerland as compared to South Africa. The Oaxaca–Blinder decomposition of the Erreygers-corrected concentration index indicates that the differences in the wellbeing concentration levels of the two countries are due to both the difference in the levels of income as well as the differences in the marginal utility of income in the two countries. Results indicate that South Africa's pro-rich concentration of wellbeing would decrease substantially with Swiss endowments. On the other hand, income based concentration of wellbeing would increase in South Africa with Swiss coefficients. The differences in the coefficients of absolute and relative income, contribute more to the differences in wellbeing concentration in the two countries than the levels of these variables. This indicates that the level of income and relative income is important in understanding the impact of these variables on wellbeing inequality. Further, the decomposition analysis of the concentration index for each country to understand the relative importance of variables indicates that while relative income is a significant driver of wellbeing inequality in South Africa and Switzerland, its importance is lower than absolute income in determining the concentration of wellbeing.

**Keywords** Wellbeing inequality · Concentration index · South Africa · Switzerland · Absolute income effect · Relative income effect · Endowment effect · Coefficient effect

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## 1 Introduction

Literature has explored the relationship between income and wellbeing since the 1970s (Easterlin 1974). It is now widely come to be acknowledged that income impacts on wellbeing through the dual modes of absolute (endowment) and relative (contrast) effects (Griffin and Gonzalez 2013). While Easterlin (1974) indicated, through the income-happiness paradox, the dominance of the relative effect as the reason for stable wellbeing at aggregate levels despite increased average incomes, Kollamparambil (2019) has shown that the absolute effect is higher than the relative effect in a context of high-poverty and inequality, like South Africa. The latter study shows therefore, that despite rising income inequality in South Africa, average wellbeing has increased over the period 2008 and 2015 on the back of increased average income levels and improved access to public amenities like electricity and sanitation. This goes against the finding of Oishi et al. (2011) in the US context, which concludes that Americans were on average less happy in years with more societal income inequality despite higher average income levels. The contrasting findings point to the fact that the dominance of absolute and relative income effect is determined by the level of income. In societies with higher average incomes, the relative income effect dominates the absolute income effect, whereas the opposite is observed in low income and high poverty countries. Dynan and Ravina (2007) reach similar conclusion using the US income distribution data finding that the relative effect of income on happiness is much stronger for people whose group has above-average income than for people whose group has below-average income. The authors thus conclude that relative concerns become an issue only when a person has attained a certain place within the income distribution. Wu and Tam (2015), through a provincial level analysis in the context of China, also highlights the level of development as being relevant in determining the socio-economic status gradient of happiness.

It can be argued from the above studies that the income wellbeing dynamics are different at different levels of income. Wellbeing and happiness concentration in the higher end of the income spectrum is expected for countries with lower average incomes as compared to richer countries. This means that, in the context of a society with high levels of poverty and income inequality, concentration of happiness is expected in the lower tail of income distribution because absolute effect dominates the relative effect. For more affluent societies, this is less clear and will depend on whether absolute or relative effect of income dominates.

Literature has only recently started investigating the concentration of wellbeing using concentration indices (Zaborskis et al. 2019), as studies thus far have focused on the gradient impact of income on happiness, most commonly using the regression analysis technique. The gradient of income estimated through regression analysis conveys the impact of average level of income on average wellbeing. The implicit assumption is that the impact on wellbeing is similar at all points of the income distribution. That this assumption is unrealistic is clear from literature thus far. Not only is there generally a positive, but diminishing wellbeing returns to income (Veenhoven 1991; Lane 2000; Clark et al. 2008), there are also distinct differences in wellbeing responses to increased income, depending on the income spectrum the individual is from (Ferrer-i-Carbonell 2005). The limiting assumption of a linear relationship between income and wellbeing is often relaxed by including polynomial terms of the income variable in the estimation model or by undertaking quantile regressions along the income distribution. These

interventions, however, do not entirely mitigate the limitation of a uniform gradient estimation, nor does it give a good indication of wellbeing inequality.

It is therefore important to understand the relationship between income and wellbeing going beyond the average effect of income on wellbeing. Earliest studies that look at the relationship between income inequality and happiness inequality were cross-country studies (Veenhoven 1990, 2005; Ovaska and Takashima 2010; Clark et al. 2012; Gandelman and Porzecanski 2013). While these studies established the important fact that developed countries have lower happiness inequality compared to developing countries, the relationship between income inequality and wellbeing inequality is still contested. While Veenhoven (2005) concludes that income inequality is not strongly related to life satisfaction inequality, Ovaska and Takashima (2010), find that income inequality has a significant positive effect on happiness inequality. Similarly, Clark et al. (2012) reports that rising income inequality moderates the fall in happiness inequality. Kollamparambil (2019) makes similar conclusion in the context of South Africa. Other single country studies like Stevenson and Wolfers (2008) and, Dutta and Foster (2013) however found that happiness inequality decreased while income inequality increased in United States of America. The study argues that strong non-pecuniary factors have driven down wellbeing inequality even in the face of increasing income inequality.

The existing studies on wellbeing inequality use standard deviations or Gini coefficients as measures of inequality and more recently the recentred influence function to model inequality in wellbeing (Becchetti et al. 2014; Stevenson and Wolfers 2008; Dutta and Foster 2013; Van Praag 2011; Niimi 2018; Kollamparambil 2019). Delhey and Kohler (2011) criticizes the standard deviation measure of wellbeing inequality because of technical dependency of the measure on a nation's mean wellbeing measured on a limited scale. The authors suggest two new measures to adjust for the effects of limited instruments. Based on these new measures, the study finds a significant relationship between income inequality and happiness inequality. Veenhoven (2011) however came out with a severe criticism of the modified measure of happiness inequality questioning the assumptions behind it.

Given the controversy surrounding the adequacy of measures of wellbeing inequality, this study explores the income wellbeing dynamics from the perspective of wellbeing concentration. This is done by investigating whether wellbeing is concentrated along parts of the income distribution using the concentration index. Concentration indices can be considered as bivariate inequality measures and have been prevalently used to analyse the socioeconomic inequality of health variables (Kakwani 1980). Koolman and van Doorslaer (2004) note that concentration index and Gini differ, as the ranking variable (income) and the variable of interest (wellbeing) are different. An extensive search of literature yielded Zaborskis et al. (2019) that explores the issue of socioeconomic inequality of wellbeing using the concentration index measure. Zaborskis et al. 2019 estimates the wellbeing inequality among adolescents using the concentration index, but does not go on to decompose the measure to identify the major drivers behind wellbeing inequality.

The objective of this study is to ascertain the relationship between income and wellbeing by exploring the level of wellbeing concentration along the income distribution. The study is undertaken by comparing two very different contexts of South Africa and Switzerland. While South Africa is a country known for low levels of average wellbeing and high levels of income inequality (Kollamparambil 2019), Switzerland is known for high levels of overall wellbeing and low levels of income inequality. This study estimates the concentration of wellbeing vis-à-vis household income using Erreygers (2009) corrected version of the concentration index using nationally representative samples for both countries and also separately across gender and population groups. Further, the study uses decomposition

analysis to explore the source of difference in the wellbeing levels and wellbeing inequality of Switzerland and South Africa.

## 2 Data and Methods

The South African data is sourced from the first (2008) and the most recent (2017) waves of the National Income Dynamics Survey (NIDS) to obtain the longest time span to understand the intertemporal shifts in wellbeing. The NIDS is a panel dataset developed by the Southern African Labour Development Research Unit (SALDRU) in collaboration with the National Treasury of South Africa. The only individual survey panel that is available in the South African context, NIDS provides a rich array of variables at individual, household and geographic levels. This also includes a host of variables that measure subjective wellbeing, household income as well as perceived relative income which are important from the perspective of this study. Other useful information included in the dataset for this study includes the respondent's individual characteristics ranging from race, educational attainment, religiosity, health, marital status etc. While the first wave consists of 16,872 individuals in 7289 households, the wave 5 sample consists of approximately 30,110 sampled individuals in 13,464 households (Brophy et al. 2018). According to the NIDS user manual, 73% of the individuals who were interviewed in Wave 1 were successfully interviewed in Wave 5. However, in order to address attrition and non-responses, especially among the higher end of the income spectrum and among minorities like the Indian and White population, NIDS had to top up the sample in wave 5. Furthermore, panel weights are created to help make the sample as representative of the South African population as possible. This analysis therefore makes use of panel weights to make the dataset as nationally representative as possible.

The Swiss data utilized is from the Swiss Household Panel (SHP), which is an annual panel study based on a random sample of private households in Switzerland from 1999. The venture is supported by the Swiss National Science Foundation. The principal aim of the Swiss Household Panel (SHP) is to observe social changes, particularly the dynamics of changing living conditions and representations in the population of Switzerland. The initial sample of 5074 households containing 12,931 household members was increased in 2004 to include a second sample of 2538 households with a total of 6569 household members; this was further increased by 4093 households and 9945 individuals since 2013. Data is mainly collected by interviewing household members telephonically and the response rate is reported as high (Swiss Household Panel 2019).

We estimate the concentration index of wellbeing to analyse the socio-economic inequality in the wellbeing distribution in Switzerland and South Africa at two points in time, 2008 and 2017. Wellbeing is measured in the NIDS survey from the question '*Using a scale of 1 to 10, where 1 means "very dissatisfied" and 10 means "very satisfied", how do you feel about your life as a whole right now?*'. Similarly, the life satisfaction variable in the SHP survey is represented by the survey question, '*In general, how satisfied are you with your life, if 0 means "not at all satisfied" and 10 means "completely satisfied"?*' Given the different scales of measuring wellbeing, the study normalises this variable for both countries to make them comparable to one another. The values post-normalisation range from 0 to 1. Lindeboom and Van Doorslaer (2004) have pointed out the concern that perceptions may differ across populations or even across subgroups of a population, biasing responses to question on wellbeing. The normalised values on wellbeing are hence

further classified into 5 categories to obtain an ordinal variable that can claim to account for the perception bias to some limited extent (see “Appendix” for details).

The concentration index is a measure of the socioeconomic inequality of wellbeing based on the ranking of the household per capita income and the wellbeing levels of all individuals over the age of 15 years in the sample. Furthermore, to explore the differences in the socio-economic inequality of happiness across gender, we estimate the wellbeing concentration index,  $CI(h)$ , for males and females separately. In addition, we also explore differences on the basis of race in the South African case, and nationality in the Swiss case. The concentration index  $CI(h)$ , introduced by Kakwani (1980) and Wagstaff et al. (1991), is defined as follows:

$$CI(h) = \frac{2}{n\mu} \sum_{i=1}^n h_i r_i - 1 \quad (1)$$

where  $n$  is sample size,  $h$  the wellbeing variable,  $\mu$  its mean and  $r$  the rank of individual  $i$  by income from poorest to richest.  $CI(h)$  is expected to lie between  $+1$  and  $-1$  for cardinal outcomes, with a positive value of  $CI(h)$  indicating that wellbeing is distributed more among the higher end of the income distribution, and a negative value indicating that it is concentrated more among the lower end of the income distribution. Further, the absolute value of the index indicates the level of concentration, with higher values indicating the wealthier end of the income spectrum and lower values indicative of the poorer end of the distribution.

Given that the wellbeing variable is ordered, we follow Erreygers (2009) to correct the concentration index through normalisation of the concentration index ( $CI(h)$ ) using the mean and the bounds of the wellbeing variable. Erreygers’ corrected concentration index is defined as:

$$E(h) = \frac{4\mu}{b_h - a_h} CI(h) \quad (2)$$

where  $b_h$  and  $a_h$  are the maximum and minimum of the wellbeing variable ( $h$ ) and  $\mu$  its mean.

Further to the estimation of the Erreygers-corrected concentration indices, decomposition analysis is also used to identify the contribution of various variables. Based on the literature on the determinants of wellbeing in the South African context (Kollamparambil 2019), we include a host of sociodemographic, economic, health and lifestyle factors to changes in income inequalities in wellbeing over time. Wellbeing is determined by both absolute and relative income levels (Clark et al. 2008). In order to control for them the study includes individual income measured as the log of per capita household income. While NIDS provides information on relative income measured as the perceived income step of the respondent derived from the question “How would you classify your household in terms of income, compared with other households in your village/suburb?” on a scale of 1 to 5, Swiss data does not contain a comparable variable. To estimate comparable models for both countries we derive a relative income variable based on Clark and Oswald (1996). The ‘comparison income’, which can be thought of as a reference level of income that an individual compares his own income with. An economic model to predict the relative wage uses a conventional earnings equation on the whole cross-section of individuals for South Africa and Switzerland separately. A Mincerian regression equation (with education and experience as predictors

of individual wage) is used to predict an earnings level,  $y^*$ , for each person which correspond to the income of ‘typical’ individual of given characteristics. Conceptually, the relationship of  $y^*$  with wellbeing may be positive or negative. The higher earnings of an individual’s reference group may lower his/her sense of well-being because of the relative status effect (Gao and Smyth 2010). The signalling effect on the other hand improves the wellbeing because the higher earnings of the reference group increase the individual’s sense of well-being through Hirschman’s (1973) ‘tunnel effect’.

Unemployment status, as a measure of socially developed characteristics, is often cited in literature as being a factor for lower wellbeing and hence we include it in our analysis (Di Tella et al. 2010). Lelkes (2006) found that the probability of having a high life satisfaction is reduced by 19% because of unemployment. Age, is without question, fundamental in determining the wellbeing of individuals and therefore included as a key variable in the analysis (Dolan et al. 2008). Other personal characteristics such as marital status and being female is expected to increase the wellbeing of individuals (Helliwell 2003 and Alesina et al. 2004).

Physical health is found to have an overwhelming impact on wellbeing both in developed and developing country contexts and is thus an imperative variable to control for (Dolan et al. 2008). To capture the racial differences in wellbeing in the South African context, we further include a dummy variable that encapsulates the black and non-black (referring to Indian, Asian, Coloured and White) population. The race variable is coded this way because the black race constitutes the majority population group in the country. In the Swiss context, we use nationality to define the majority and minority groups, with Swiss nationals, and non-Swiss constituting the majority, and minority population respectively.

Lastly, empirical studies on wellbeing has found that religion is an important factor related to wellbeing (Helliwell and Putnam 2004). Rehdanz and Maddison (2005) found that regardless of the religion one belongs to, the average happiness of different countries was greater among individuals who perceived themselves to be religious. A detailed variable description of the variables are included in “Appendix” (Table 11).

We undertake an Oaxaca–Blinder decomposition (Blinder 1973; Oaxaca 1973) to partition the components of the observed country differences in wellbeing concentration, into a component attributable to compositional differences between groups (that is, differences in characteristics or endowments, Explained component) and to differences in the effects of characteristics (that is, differences in coefficients, or behavioral responses, Unexplained component) (Kollamparambil and Razak 2016).

$$Y_{it}^{SA} = \alpha_i^{SA} + \beta^{SA}x_{it} + \varepsilon_{it}^{SA} \quad (3)$$

$$Y_{it}^{CH} = \alpha_i^{CH} + \beta^{CH}x_{it} + \varepsilon_{it}^{CH} \quad (4)$$

where  $Y$  is the dependent variable and  $x$  is a vector of regressors similar to those mentioned above. The decomposition is calculated by subtracting the two equations which yields:

$$Y_{it}^{CH} - Y_{it}^{SA} = \beta^{CH}(X_{it}^{CH} - X^{SA}) + (\alpha_i^{CH} - \alpha_i^{SA}) + (\beta^{CH} - \beta^{SA})X^{SA} \quad (5)$$

From Eq. 5,  $\beta^{CH}(X_{it}^{CH} - X^{SA})$  is the “explained” portion (a), of the gap. It is the wellbeing-gap attributable to the differences in mean observable characteristics between Switzerland (CH) and South Africa (SA).  $(\alpha_i^{CH} - \alpha_i^{SA}) + (\beta^{CH} - \beta^{SA})X^{SA}$  is the “unexplained” portion (b+c), i.e. the differences in constant and coefficient estimates. This is the wellbeing disparity that would still remain if South Africa had the average characteristics of persons in

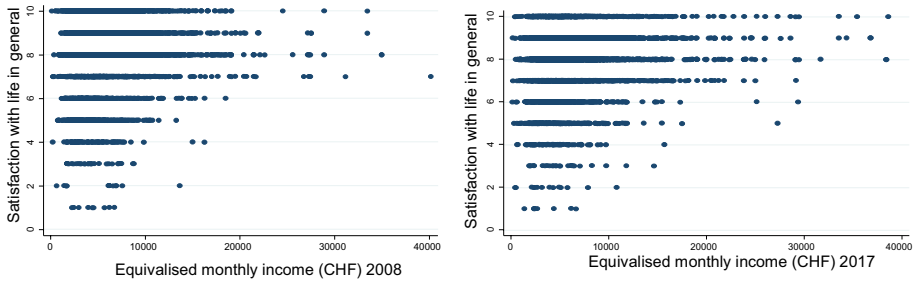


Fig. 1 Scatterplots of wellbeing distribution in Switzerland, 2008 and 2017

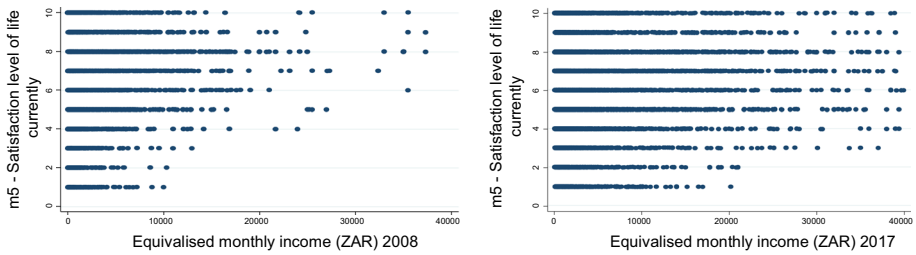


Fig. 2 Scatterplots of wellbeing distribution in South Africa, 2008 and 2017

Switzerland. The total gap at means between Switzerland and South Africa is the sum of the observable characteristics portion and returns or coefficient portion.

The decomposition of the erreygers-corrected concentration index is undertaken using the *oaxaca\_rif* command in Stata 15 using the *eindex* option (Rios-Avila 2019). Further, in order to comprehend the relative importance of variables in determining wellbeing inequality, we undertake separate country decompositions for each country. Through the decomposition of the concentration indices we are able to quantify the source of overall inequality among the various determinants for each country at two time points, with bootstrapped standard errors of absolute contributions. To account for the heterogeneity observed in the scatter plots (Figs. 1, 2) heteroscedastocity-consistent “robust” standard error estimations are undertaken of the model:

$$h_i = \alpha + \sum_k \beta_k X_{ki} + u_i \tag{6}$$

$u_i$  is the error produced by the linear approximation to estimate marginal effects ( $\beta_k^m$ ).

Following Gonzalo-Almorox and Garrido (2016) we decompose  $CI(h)$  as:

$$CI(h) = \sum_k \left( \frac{\beta_k X_k^-}{\mu} \right) CI_k + \frac{GCI_\epsilon}{\mu} \tag{7}$$

where  $\mu$  is the mean of  $h$ ,  $X_k^-$  is the mean of  $X_k$  and  $CI_k$  is the mean of concentration index of  $X_k$ ,  $GCI_\epsilon$  is the generalised concentration index for the error term.

**Table 1** Descriptive statistics—South Africa and Switzerland. *Source:* Author calculated from NIDS and SHP using panel weights

	2008		2017	
	Mean	SD	Mean	SD
<i>South Africa</i>				
Subjective wellbeing	5.46	2.49	5.56	2.38
Subjective wellbeing (normalised)	0.496	0.274	0.507	0.273
Income (Rands, monthly)	1392.4	2988.5	3117.1	9894.4
Income (PPP USD, monthly)	341.2	732.4	513.02	1628.4
Relative income	2.40	0.93	2.57	0.96
Contrast	0.35	0.48	0.60	0.49
Age	36.52	16.24	37.68	15.97
Black	0.77	0.42	0.81	0.39
Married	0.34	0.47	0.33	0.47
Unemployed	0.32	0.46	0.28	0.44
Urban dwelling	0.63	0.48	0.66	0.47
Good health	0.83	0.38	0.90	0.3
Medical aid	0.18	0.38	0.16	0.36
Observations	12663		22341	
<i>Switzerland</i>				
Subjective wellbeing	7.96	1.42	8.04	1.31
Subjective wellbeing (normalised)	0.779	0.154	0.789	0.144
Income (Swiss Francs, monthly)	5670.8	4226.5	6067.7	3583.2
Income (PPP USD, monthly)	3696.70	2755.2	5098.9	3011.1
Education years	13.02	3.06	13.60	3.35
Age	48.78	17.63	49.33	18.89
Swiss	0.79	0.41	0.76	0.43
Married	0.57	0.50	0.51	0.50
Unemployed	0.20	0.40	0.13	0.33
Male	0.49	0.50	0.49	0.50
Good health	0.84	0.37	0.85	0.35
Religious	0.23	0.42	0.10	0.30
Observations	5962		8407	

*SD* standard deviation

### 3 Data and Preliminary Analysis

Scatter plots (Figs. 1, 2) of wellbeing across income levels indicate heterogeneity for both countries, the subsequent analysis therefore uses heteroscedasticity-consistent “robust” standard error estimations to account for this.

The means and standard deviations of the relevant variables for 2008 and 2017 is listed in Table 1 for both South African and Swiss samples. The average incomes between the two countries, measured in PPP USD for comparison sake, reflects the almost ten-fold gap in income levels between the two countries. It is therefore not surprising that that average wellbeing (on normalized scale) in Switzerland (0.779) is far higher than that of South



**Table 2** Average wellbeing levels in South Africa. *Source:* Author calculated from NIDS and SHP using panel weights

	Wave 1 (2008)				Wave 5 (2017)			
	Mean	SE	Confidence interval		Mean	SE	Confidence interval	
Total	5.46	0.02	5.42	5.51	5.56	0.02	5.53	5.59
Male	5.56	0.03	5.49	5.62	5.58	0.02	5.53	5.63
Female	5.40	0.03	5.35	5.45	5.54	0.02	5.50	5.58
Black	5.08	0.02	5.04	5.13	5.33	0.02	5.29	5.37
Non-black	6.78	0.04	6.70	6.85	6.45	0.03	6.39	6.52

**Table 3** Average wellbeing levels in South Africa (Normalised 0–1). *Source:* Author calculated from NIDS and SHP using panel weights

	Wave 1 (2008)				Wave 5 (2017)			
	Mean	SE	Confidence interval		Mean	SE	Confidence interval	
Total	0.496	0.002	0.494	0.498	0.507	0.002	0.505	0.509
Male	0.506	0.004	0.499	0.514	0.509	0.003	0.499	0.514
Female	0.489	0.003	0.486	0.492	0.505	0.002	0.503	0.507
Black	0.454	0.003	0.499	0.514	0.481	0.002	0.499	0.514
Non-black	0.642	0.004	0.638	0.646	0.606	0.004	0.602	0.61

Africa (0.496). There are remarkable differences in the unemployment rate between the two countries as well, with South Africa and Switzerland reporting 28% and 13% respectively in 2017. In the Swiss sample, Swiss nationals constitute 79% and 77% of the sample for 2008 and 2017 respectively. Black population, as the majority of the race group in South Africa, comprise of 77% and 81% of the South African sample in 2008 and 2017 respectively.

Table 2 shows the average wellbeing between male, female, black and non-black individuals in South Africa. Although there is statistically significant increase in wellbeing between wave 1 and 5 for South Africa, the change between the two periods is not statistically significant for the male sub-sample. The difference in wellbeing levels between the males and females is significant in the first period but the gap seems to be reduced with female wellbeing levels having risen more than male. As a result, the gender gap in wellbeing is no longer significant in the second period. Blacks have a statistically lower wellbeing level as compared to non-blacks. However, it is important to note that the gap has been diminishing, with non-blacks marking a significant decline in their wellbeing from 6.75 to 6.31, while black sample has recorded a positive and significant, improvement in wellbeing.

We present normalised values in Table 3 for ease of comparison with Swiss figures. The observations highlighted for Table 2 also applies for Table 3. It is thus clear that the dynamics of wellbeing in South Africa is not homogenous across race and gender groups as also indicated by past literature (Posel and Casale 2011; Moller 1998, 2007; Hinks and Gruen 2007) (Table 4).

Tables 5, 6 and 7 contains the average wellbeing effects for the Swiss sample. Expectedly, the Swiss wellbeing statistics are distinctly different from that of South Africa. To

**Table 4** Average wellbeing levels in South Africa (Ordered 0–4)

	Wave 1 (2008)			Wave 5 (2017)		
	Mean	SE	Confidence interval	Mean	SE	Confidence interval
Total	2.017	0.008	2.001 2.033	2.065	0.006	2.054 2.077
Male	2.042	0.013	2.017 2.067	2.073	0.010	2.054 2.092
Female	2.000	0.011	1.980 2.021	2.060	0.008	2.045 2.076
Black	1.889	0.009	1.871 1.906	1.988	0.007	1.975 2.001
Non-black	2.463	0.016	2.433 2.493	2.376	0.013	2.350 2.402

**Table 5** Average wellbeing levels in Switzerland. *Source:* Author calculated from NIDS and SHP using panel weights

	Wave 1 (2008)			Wave 5 (2017)		
	Mean	SE	Confidence interval	Mean	SE	Confidence interval
Total	7.96	0.02	7.92 8.00	8.04	0.01	8.01 8.07
Male	8.02	0.02	7.97 8.07	8.10	0.02	8.06 8.13
Female	8.00	0.02	7.96 8.05	8.12	0.02	8.08 8.15
Swiss	8.04	0.02	8.01 8.07	8.14	0.01	8.11 8.17
Non-Swiss	7.72	0.06	7.6 7.84	7.81	0.05	7.72 7.9

**Table 6** Average wellbeing levels in Switzerland (Normalised 0–1)

	Wave 1 (2008)			Wave 5 (2017)		
	Mean	SE	Confidence interval	Mean	SE	Confidence interval
Total	0.779	0.002	0.775 0.783	0.789	0.001	0.787 0.793
Male	0.780	0.003	0.775 0.785	0.789	0.002	0.784 0.793
Female	0.778	0.003	0.773 0.783	0.791	0.002	0.787 0.795
Swiss	0.782	0.002	0.778 0.786	0.793	0.002	0.790 0.796
Non-Swiss	0.747	0.007	0.733 0.760	0.757	0.005	0.747 0.767

**Table 7** Average wellbeing levels in Switzerland (Ordered 0–4)

	Wave 1 (2008)			Wave 5 (2017)		
	Mean	SE	Confidence interval	Mean	SE	Confidence interval
Total	3.033	0.007	3.021 3.046	3.045	0.005	3.036 3.055
Male	3.020	0.009	3.001 3.038	3.030	0.007	3.016 3.044
Female	3.045	0.009	3.027 3.062	3.058	0.007	3.045 3.072
Swiss	3.050	0.007	3.036 3.063	3.056	0.005	3.046 3.067
Non-Swiss	2.924	0.021	2.884 2.965	2.971	0.016	2.940 3.002

**Table 8** Concentration index of wellbeing# in South Africa and Switzerland

	2008				2017			
	Concentration index	SE	Lower	Upper	Concentration index	SE	Lower	Upper
<i>South Africa</i>								
All	0.127***	0.005	0.122	0.132	0.086***	0.003	0.083	0.089
Male	0.124***	0.007	0.117	0.131	0.088***	0.004	0.084	0.092
Female	0.128***	0.006	0.122	0.134	0.086***	0.004	0.082	0.09
Black	0.085***	0.005	0.08	0.09	0.068***	0.004	0.064	0.072
Non-black	0.062***	0.009	0.053	0.071	0.046***	0.007	0.039	0.053
<i>Switzerland</i>								
All	0.026***	0.004	0.022	0.03	0.021***	0.003	0.018	0.024
Male	0.023***	0.006	0.017	0.029	0.019***	0.004	0.015	0.023
Female	0.028***	0.005	0.023	0.033	0.023***	0.004	0.019	0.027
Swiss	0.022***	0.004	0.018	0.026	0.016***	0.003	0.013	0.019
Non-Swiss	0.040***	0.012	0.028	0.052	0.046***	0.009	0.037	0.055

Lower and upper refer to the lower and upper bounds of the confidence interval, #ordered wellbeing variable (0–4) is used

\*\*\*Significance at 1% level

begin with, the average general life satisfaction for the whole sample is much higher at 0.78 in 2008, almost double the South African levels (0.49). The difference between the countries is maintained in 2017 as well. Furthermore, the wellbeing levels of the majority (Swiss nationals) is seen to be significantly higher than that of the minority non-Swiss population. The upside, however, is that both the minority and the majority groups have recorded an increase in wellbeing over time. This is unlike in South Africa, where the minority (non-black) have a higher mean wellbeing level but there has been a significant decline in their wellbeing in the period 2008–2017 (Table 2).

## 4 Wellbeing Inequality

Table 8 brings out the concentration of wellbeing among the affluent in both South Africa and Switzerland. This is observed in the whole sample as well as across gender and race groups at 1% level of significance. The degree of pro-rich concentration is observed to be much higher for South Africa compared to Switzerland. Further, the trend over 2008–2017 for the country samples indicates that the level of concentration has significantly declined for South Africa over time. The decline in concentration in South Africa over the period 2008–2017 is observed across both sexes as well as the majority as well as minority race groups. In the case of Switzerland, inequality of wellbeing concentration has decreased for males as well as for females. Unlike in the case of South Africa, pro-rich concentration of wellbeing in Switzerland is higher among minorities (non-Swiss) compared to the majority population. Further the pro-rich wellbeing concentration is increasing among the minority population group in Switzerland.

To identify the source of the differences in the concentration levels of the two countries, we next undertake the Oaxaca Blinder (OB) decomposition of the concentration indices for South Africa and Switzerland. It is clear from the OB decomposition that while a

**Table 9** Oaxaca Blinder decomposition of Erreygers corrected concentration index across Switzerland (CH) & South Africa (SA), 2008 and 2017

Variables	(2008)		(2017)	
	Explained	Unexplained	Explained	Unexplained
Income (log)	0.129*** (0.032)	-0.399** (0.167)	0.067*** (0.022)	-0.476*** (0.146)
Relative income (log)	0.244*** (0.047)	-1.629*** (0.493)	0.183*** (0.032)	-0.539** (0.306)
Religious	0.037*** (0.014)	0.009*** (0.002)	0.057*** (0.012)	0.007*** (0.002)
Age	0.009 (0.011)	0.233** (0.095)	0.031** (0.014)	0.175** (0.079)
Age squared	-0.005 (0.010)	-0.131** (0.056)	-0.021 (0.014)	-0.123** (0.050)
Male	-0.002*** (0.001)	0.0245*** (0.006)	-0.001** (0.0004)	0.015*** (0.005)
Healthy	0.001 (0.002)	-0.184*** (0.037)	0.0005 (0.0005)	-0.164*** (0.029)
Unemployed	0.0002 (0.002)	0.008 (0.007)	-0.0065* (0.003)	0.023*** (0.006)
Majority	-0.0133*** (0.001)	0.101*** (0.018)	-0.005*** (0.0008)	0.041*** (0.014)
Total	0.399*** (0.046)	-0.532*** (0.046)	0.304*** (0.033)	-0.386*** (0.034)
Mean_CH	0.037*** (0.004)		0.035*** (0.003)	
Mean_SA	0.170*** (0.005)		0.117*** (0.004)	
Difference	-0.132*** (0.007)		-0.082*** (0.005)	
Constant		1.437*** (0.475)		0.654 (0.398)

Bootstrapped standard errors (500 repetitions) in parenthesis

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$

substantial proportion of the concentration differences is attributable to level difference, there is also considerable proportion that is due to the differences in the marginal utility of income in the two countries (Table 9). Considering the explained component separately, the results indicate that the mean difference in the concentration indices of Switzerland and South Africa would have been 0.399 if South Africa had the same characteristics as Switzerland as compared to the existing difference of -0.132. The positive difference points to the possibility of negative concentration index for South Africa with Swiss endowments. The negative unexplained share of -0.532 indicates on the other hand that with the Swiss coefficients, South African concentration index would be much higher than its current mean level of 0.17 increasing the difference from -0.132 to -0.532.

The differences in the income levels contributed 32% and 22% to the explained differences in the pro-rich wellbeing concentration levels of the two countries in 2008 and 2017 respectively. The contribution of differences in the marginal utility of income increased from 75 to 123% during the same period.

The relative income variable contributed 61% and 60% in 2008 and 2017 respectively towards the explained differences in the wellbeing concentration in the two countries. The response to relative income accounted for over 300% of the unexplained difference in the wellbeing concentration of the two countries in 2008, but this fell to 139% in 2017. Differences in the religiosity of population is also a significant contributor to differences in the wellbeing concentration. There is higher wellbeing concentration among the Swiss population as compared to the Black population in South Africa. There is higher concentration of wellbeing among male in Switzerland compared to South Africa. Good health contributes to wellbeing concentration in South Africa more than to Switzerland through the coefficient channels. Only a minority of population in South Africa have access to medical insurance and quality healthcare, whereas Switzerland enjoys universal health care access making it a differentiating factor in South Africa. It appears that the Swiss compulsory medical insurance coverage<sup>1</sup> which is touted as one of the World's best universal health care system (De Pietro et al. 2015), mitigates the inequality impact of health. The significance of unemployment has increased in 2017 as compared to 2008.

Lastly, to compare the relative importance of the determinants of wellbeing inequality within the two countries we undertake a decomposition of the concentration index for each country (Table 10). Of the determinants considered, those observed to be concentrated among the poor are: married, age and religious in the Swiss sample and, majority race (black) and the unemployed in the South African sample. All other variables are concentrated more among the rich in both countries.

*Income* has a positive and significant effect on wellbeing inequality for both countries and its contribution increased from 53 to 73% for SA and 96 to 106% for Switzerland over the period 2008-2017. Despite being a high-income country with low income inequality, income is the most important contributor to wellbeing inequality for Switzerland. Moreover, a substantial increase in the contribution of income towards wellbeing inequality can be observed over the period of study. A comparison of the Swiss and the reduced South African model indicates that the contribution of income is higher for Swiss results in explaining wellbeing inequality. This appears at first instance to be a paradox given the expectation of diminishing returns to income for higher income country like Switzerland. However, these results reiterate the conclusion by Kollamparambil (2019) that increased access to public goods is an important factor driving wellbeing in South Africa. In Switzerland, where the access rate to public goods and services has already reached the threshold, recent trends in wellbeing inequality is driven fundamentally by income. Therefore, although income is important and indeed the single largest contributor to wellbeing in both countries, access to public utilities in countries with low income also play an important role.

The relative income variable is seen to have a positive and significant impact on wellbeing concentration in South Africa but not for Switzerland. The contribution of relative

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<sup>1</sup> Regulated by the Swiss Federal Law on Health Insurance and implemented at canton-level within a highly decentralized regulatory framework, healthcare system in Switzerland is one of the best in the world (De Pietro et al. 2015). Although there are no free state-provided health services, private health insurance (which is subsidised for low-income) is mandatory for all.

**Table 10** Decomposition of Errgeyers corrected concentration index across country, 2008 and 2017

	2008			2017		
	Coefficient	CI#	%	Coefficient	CI#	%
<i>South Africa</i>						
Income (log)	0.097***	0.097	52.66	0.081***	0.085	72.99
Relative income (log)	0.023***	0.025	12.52	0.008***	0.022	7.69
Majority (Black)	0.047***	-0.114	28.26	0.025***	-0.099	21.77
Married	0.003***	0.122	2.03	0.007***	0.165	6.21
Age	-0.039***	0.042	-23.32	-0.03***	0.038	-26.08
Age squared	0.027***	0.068	16.37	0.023***	0.061	20.25
Male	-0.001*	0.076	-0.61	-0.002***	0.083	-1.61
Healthy	0.002***	0.008	1.47	0.001***	0.004	1.03
Unemployed	0.003***	-0.227	2.63	0.001	-0.257	0.59
Religious	0.002***	0.011	1.26	0.001***	0.006	1.15
Residual	0.005		6.73	-0.001		-3.98
<i>Switzerland</i>						
Income	0.037***	0.027	96.19	0.037***	0.025	108.98
Comparison income	0.001736	0.002	4.56	-0.002	0.002	-7.19
Majority (Swiss)	0.002***	0.034	5.79	0.002***	0.028	4.67
Married	-0.003***	0.038	-7.84	-0.003***	0.031	-8.17
Age	0.0004	-0.001	1.02	0.004*	-0.007	12.31
Age squared	-0.005***	-0.018	-13.41	-0.01***	-0.025	-30.84
Male	-0.001***	0.037	-1.88	-0.0001*	0.039	-0.24
Healthy	0.009***	0.010	24.18	0.007***	0.007	20.06
Unemployed	-0.002***	-0.148	-5.23	2.27E-06	-0.151	0.01
Religious	-1.5E-05	-0.020	-0.03	-0.00012	-0.046	-0.38
Residual	-0.00129		-3.34	0.0002		0.79

Bootstrapped standard errors (500 repetitions)

CI indicates concentration index, # all the estimated CI indices are significant at 1% significance level

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$

income variable however is much lower than that of absolute income in South Africa. The significance of the relative income variable in South Africa is reflective of the impact of the income inequality on subjective wellbeing. This is not surprising given the low average income of the sample as well as the high poverty levels of South Africa.

There has been a decline in the positive contribution of *Black majority* towards wellbeing inequality in South Africa. This is in keeping with the increasing levels of wellbeing, among Black population highlighted in Table 4 as compared to the decline in wellbeing among non-black population. In contrast, the *male* variable contributed negatively to wellbeing inequality and the contribution has increased over the period 2008–2017.

In the case of Switzerland, the other important determinants with large contribution to the pro-rich inequality is *Healthy* variable. Old age on the other hand seem to be an

equaliser of wellbeing. While being Swiss also contributes to wellbeing inequality, all other variables like education age etc. are seen to reduce wellbeing inequality. Swiss nationality is also an important positive contributor to inequality. Variables contributing to a reduction in wellbeing inequality are education, married, age, unemployed and religion. The negative contribution of these variables, however, have shown a decline over the period of study.

## 5 Limitations

Concentration index is not without limitations as a measure of income inequality of wellbeing. A major drawback is that it only accounts for the rank of income and not for changes in the levels of income between groups (Alonge and Peters 2015). It nevertheless is meaningful and provides an additional dimension to wellbeing inequality measurement to supplement the more commonly used measures of standard deviation/variance/Gini coefficient. Methods apart, the study had to devise ways to combine the data of different surveys in two countries. The scale of measurement of the life satisfaction had to be harmonised through normalisation and subsequent reclassifying into ordered variable to account for perception bias. The income variable was also converted from local currency to US dollars using purchasing power parity rates of exchange. Further, in the absence of a direct measure on relative income for the Swiss data, the study had to derive a variable using the mincerian wage equation that could be comparable across both countries. While this is less than optimal, the approach is not new and has been found to be effective in the past.

## 6 Discussion

Our study shows that income related wellbeing inequality exists not only in less affluent societies with high levels of income inequality but also in the richer societies with higher levels of income equality. This is observed in the whole sample as well as across gender and population groups in both South Africa and Switzerland. The degree of pro-rich wellbeing concentration is much higher for South Africa compared to Switzerland. The level of concentration however is observed to have declined significantly in South Africa and marginally in Switzerland. Moreover, a gender-wise analysis indicates that the differences in income inequality of wellbeing across genders have declined over time in both countries.

A population group-wise analysis indicates that the majority (black race in South Africa) has higher degree of wellbeing concentration among the upper end of income distribution as compared to the minority (non-black). The opposite is true for Switzerland, with income-based wellbeing concentration being higher for the minority, the non-Swiss. Both countries also register a declining trend in concentration indices of the majority groups. The non-black race (minority group in South Africa) shows a decrease in concentration, as against the increased concentration levels among the minority group (non-Swiss) in Switzerland. The higher concentration levels of majority group in South Africa needs to be juxtaposed against the fact that average incomes among non-blacks (minority groups) in South Africa are much higher than that of the majority black population (Leibbrandt et al. 2012).

The opposite is true for the majority and minority groups in Switzerland. Concentration of wellbeing is higher among the minority groups as against the more affluent majority group.

The Oaxaca–Blinder decomposition points to the difference in the endowments as well as wellbeing responses to the income and other variables of the two countries. South Africa's pro-rich concentration of wellbeing would decrease substantially with Swiss endowments. On the other hand, income based concentration of wellbeing would increase in South Africa with Swiss coefficients. The decomposition indicates that differences in the income levels contributed 32% and 22% to the explained differences in the pro-rich wellbeing concentration levels of the two countries in 2008 and 2017 respectively. The unexplained contribution of income to the difference in the wellbeing inequality of the two countries increased from 75 to 123% during the same period. The relative income variable contributed 61% and 60% in 2008 and 2017 respectively towards the explained differences in the wellbeing concentration in the two countries. The response to relative income accounted for over 300% of the unexplained difference in the wellbeing concentration of the two countries in 2008, but this fell to 139% in 2017. The differences in the marginal utility of absolute and relative income contribute more than the levels of these variables, to the differences in wellbeing concentration in the two countries. This indicates that the level of income and relative income is important in understanding the impact of these variables on wellbeing inequality.

Further, the decomposition analysis to understand the drivers of the concentration index of each country indicates that while relative income is a significant driver of wellbeing inequality in South Africa, its importance is lower than absolute income in determining the concentration of wellbeing. This is as hypothesised for a country with high levels of poverty and in line with the findings of Kollamparambil (2019). The share of absolute income is increasing in determining wellbeing inequality. It is therefore evident that the current income levels matter most in the South African context in determining wellbeing inequality. The contribution of absolute income to wellbeing inequality is even higher in the Swiss context. Non-income factors like access to public goods which are relevant in the South African context are not so important in Switzerland. This is because of the high penetration rate of public goods in Switzerland, it has ceased to become the differentiating factor for wellbeing inequality. Income therefore is the dominant factor driving wellbeing inequality even in a high-income country like Switzerland.

## 7 Conclusion

Literature has for many years now grappled with the relationship between income and wellbeing. While studies (Griffin and Gonzalez (2013), thus far have highlighted the importance of both endowment and contrast effect when it comes to income as a determinant of wellbeing, the diminishing marginal utility of income also has raised the question of relevance of income in determining wellbeing at higher income levels (Veenhoven 1991; Lane 2000; Clark et al. 2008). In this context, the current study seeks answers to the



broader question through a seldom utilised technique of concentration index in measuring income related wellbeing inequality.

The study set out to compare the wellbeing inequality in the context of Switzerland and South Africa, two diametrically opposite countries, the former with high levels of wellbeing and low levels of income inequality and the latter with low levels of wellbeing and high levels of income inequality. The findings of the analysis highlight that even at higher levels of income like Switzerland, significant pro-rich wellbeing concentration is observed. The degree of concentration however, is notably lower for Switzerland, as compared to South Africa with high level of poverty and income inequality.

The study is important in that it is able to add to the debate on the income-wellbeing relationship by arguing that the diminishing marginal utility of income even in a high-income country is not sufficient to wipe out income related wellbeing inequality. However, the Oaxaca–Blinder decompositions indicates that returns to income and relative income is higher for South Africa and contributes significantly to wellbeing inequality differences between the two countries. This indicates that at lower levels of income and higher levels of income inequality, the absolute and relative income variables have a higher impact on wellbeing inequality. The results indicate that South Africa's concentration index would be negative if South Africa had the same characteristics as Switzerland. On the other hand, South African concentration index would be much higher than its current mean level if it had the coefficients of Switzerland. This points to the difference in the endowments as well as wellbeing responses to the income and other variables of the two countries.

The decomposition of factors contributing to wellbeing inequality within each country underlines the predominant role of income in both countries. The share of income in explaining wellbeing inequality is seen to be higher for Switzerland than South Africa. The findings with respect to South Africa dovetails with the argument made by Kollamparambil (2019) that non-income related factors like increased access to public amenities (like electricity, water and sanitation) has been contributing to improvement in wellbeing among the poor despite increasing income inequality. In a developed country like Switzerland, where the access rate to such public goods and services is already reached the threshold, recent trends in wellbeing inequality is driven fundamentally by income. Absolute income therefore continues to be important determinant of wellbeing inequality and its contribution in fact has increased over the 10 year period of this study for both the countries.

## Appendix

See Table 11.

This study has been realized using the data collected by the Swiss Household Panel (SHP), which is based at the Swiss Centre of Expertise in the Social Sciences FORS. The project is financed by the Swiss National Science Foundation. <https://doi.org/10.23662/FORS-DS-932-2>.

**Table 11** Description of explanatory variables and their expected effects on the outcome

Explanatory variable	Description	Type of variable	Expected effect on wellbeing
Subjective wellbeing (Normalised)	Self-assessed life satisfaction	Continuous range bound 0–1	Underlying variable
Subjective wellbeing (Ordered)	Subjective wellbeing reclassified as: Normalised 0 0.01–0.3 0.31–0.6 0.61–0.9 Greater than 0.9	Ordinal 0–4	Dependent variable
Age	Age of respondent	Continuous	Positive
Black	Race of the respondent: 1 = black, 0 = non-black	Dummy	Negative
Swiss	Nationality of the respondent: 1 = Swiss, 0 = non-Swiss	Dummy	Positive
Married	Marital status of respondent: 1 = married or living with a partner 0 = single or divorced	Dummy	Positive
Female	Gender descriptor: 1 = respondent is female 0 = respondent is male	Dummy	Positive
Income	Natural log of per capita household income converted to US dollars using PPP exchange rates income	Continuous	Positive
Education	Number of years of education years completed	Continuous	Positive
Unemployed	Employment status using the broad definition: 1 = unemployed 0 = employed	Dummy	Negative
Relative income	Derived from Mincerian wage equation	Continuous	Positive
Health outcomes (Normalised)	Self-assessed health level	0–1	Positive
Religion	Denotes the importance of religion: 1 = important 0 = not important	Dummy	Positive

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