

**Authors:**

Mduduzi Biyase

University of Johannesburg, School of Economics, South Africa

Liza-Mari Volschenk

University of Johannesburg, School of Economics, South Africa

Sheila de Carvalho

University of Johannesburg, School of Economics, South Africa

## OCCUPATION STATUS-SUBJECTIVE WELL-BEING NEXUS: A QUANTILE REGRESSION ANALYSIS

### ABSTRACT

We investigate the relationship between occupation status and subjective well-being (SWB) in South Africa, an issue that has received almost no attention in this field, with data from the 2008, 2010, 2012, 2014 and 2017 waves of the National Income Dynamics Study (NIDS). While the results based on the random effect ordered probit (REOP) suggest a positive relationship between occupation and SWB, the quantile regression estimates reveal a differential influence of occupation for individuals at different levels of the conditional SWB distribution. Specifically, the quantile regression reveals that while occupation status enters with an expected positive sign, its significant effect is mostly located in the lower to slightly upper part of the SWB distribution (Q25 and Q75). Thus, while our finding clearly supports the positive effect of occupation reported in the existing literature, the distributional influence is more nuanced, implying that the estimates derived from the standard estimators (such as REOP model) might underestimate this effect of occupation at these quantiles at the Q25. The effect of occupation on SWB is robust to the inclusion of interaction terms, such as the interactive effect between race and SWB.

**KEYWORDS:** NIDS, Occupation; Quantile Regression; REOP; SWB**JEL CLASSIFICATION:** L22; M13

### RIASSUNTO

*La relazione tra lo stato occupazionale e il benessere soggettivo:  
un'analisi di regressione quantilica*

In questo studio analizziamo per la prima volta la relazione tra stato occupazionale e benessere soggettivo in Sud Africa, tramite dati NIDS (National Income Dynamics Study) relativi al 2008,

2010, 2012, 2014 e 2017. Mentre i risultati basati su REOP (Random Effect Ordered Probit) suggeriscono una relazione positiva tra occupazione e benessere soggettivo, le stime della regressione quantilica mostrano che lo stato di occupazione ha un'influenza diversa sugli individui a seconda del loro livello di benessere soggettivo. Precisamente, la regressione quantilica evidenzia che mentre lo stato occupazionale mostra un segno positivo, il suo effetto significativo è per lo più situato nell'intervallo Q25 e Q75 della distribuzione del benessere soggettivo. Quindi, mentre questo risultato è chiaramente coerente con l'effetto positivo dell'occupazione descritto dalla letteratura esistente, l'influenza distributiva è più sfumata in quanto le stime ottenute con il modello REOP potrebbero sottostimare l'effetto dell'occupazione nel quantile Q25. Gli effetti dell'occupazione sul benessere soggettivo risultano robusti se si includono termini di interazione come l'effetto interattivo tra razza e benessere soggettivo.

## 1. INTRODUCTION

Until recently, empirical investigations of SWB/happiness were dominated by the fields of psychology and sociology. Since then, SWB/happiness literature has captured the attention of economists (Frey and Stutzer, 2003). Research on SWB has thus far placed more emphasis on the relationship between SWB and absolute income (Diener, 1984; Easterlin, 1974); relative income (Posel and Casale, 2011); wealth (Headey and Wooden, 2004); age (Botha and Booysen, 2013; Fagley and Adler, 2012); ethnicity (Davis and Wu, 2014); marital status (Filiz, 2014; Lee *et al.*, 2013); education (Witter *et al.*, 1984); obesity (Katsaiti, 2012; Stutzer, 2007); social capital effects (Helliwell and Putnam, 2004); capabilities (Veenhoven, 2010) and other determinants.

An important question which has received almost no attention in the literature, is how occupation status influences SWB. To the best of our knowledge, Hessels *et al.* (2018) is the only study that has partially answered this question using Eurobarometer data for a large number of European countries (2008-2012). However, Hessels *et al.* (2018) employ ordered probit regressions which provide only an average effect of occupation on SWB distribution. While ordered probit shed some light on occupation-SWB nexus, it ignores the heterogeneity across SWB distribution (Binder and Coad, 2011). Our study does not rule out the possibility of the heterogeneity of occupation-SWB relation. In particular, we build and improve on their work in three important ways. We explicitly compare the estimates derived from the traditional “conditional mean

analysis”, such as random effect ordered probit (REOP), with quantile regression estimates which accounts for heterogeneous effect of occupation status on SWB.

Secondly, while Hessels *et al.* (2018) examined the relationship between occupation and SWB using Eurobarometer data for a large number of European countries, comparatively no studies have been undertaken in the South Africa context or using South African data. Thus, our paper addresses this unfortunate neglect, by employing data from the 2008, 2010, 2012, 2014 and 2017 waves of the National Income Dynamics Study to investigate the effect that occupation might have on SWB.

Thirdly, we contextualize the analysis by considering the interacted effect of race on SWB. This is justified in the South African context for a number of reasons. (i) Before the collapse of the oppressive apartheid regime and the dawn of democracy, South African population groups lived under very different socio-economic conditions. (ii) Long after the dawn of democracy, differences in socio-economic conditions between different population groups is still a noticeable feature of the contemporary South Africa.

The paper is structured as follows; Section 2 reviews the existing literature. Section 3 describes the dataset and summary statistics. Section 4 discusses the methodology: the REOP regression and associated empirical specifications and quantile regressions. The second last section presents the estimates derived from the quantile and REOP regressions. The last section provides some concluding remarks.

## 2. LITERATURE REVIEW

The idea that occupation status is associated with subjective well-being can be located in the “top-down” and “bottom-up” theories (Diener, 1984). The standard proposition of the bottom-up theory is that individuals’ overall life satisfaction or SWB is dependent on his or her satisfaction level in several areas of life, such as the relationships they have with friends and family, the employment they hold, and the status of their health. The more an individual’s needs are satisfied, the greater the happiness they will possess (Andrews and Whitey, 2012). On the other hand, the top-down takes the view that individuals’ satisfaction is a function of a number of external joyful moments (such as getting married and earning higher income) – accumulated over time (Diener, 1984; Loewe *et al.*, 2014). Implicit in the latter theory is the assumption that individuals can attain

higher levels of SWB by simply manipulating their surrounding socio-economic conditions (Compton and Hoffman, 2019).

As noted in the introduction, the determinants of SWB (such as income, gender, age, education and marital status) are vigorously discussed in the literature. Among several potential SWB determinants, absolute income is accounted for in many studies (Cramm and Nieboer, 2012; Di Tella *et al.*, 2010; Ferrer-i- Carbonell, 2005; Posel and Casale, 2011; Winkelmann and Winkelmann, 1998). A common finding among these studies is that absolute income can have a positive effect on SWB. For example, Di Tella *et al.* (2010) use individual panel data for people residing in Germany from 1984 to 2000. In their study they take into account the numerous lags of income as well as status and make comparisons with the long-run effects. They conclude that happiness changes over time as individuals begin to adapt to their change in income. However, this finding is not universal in the SWB literature. Some studies suggest that income increases at a decreasing rate – diminishing return – implying that income plays an important role for the SWB of the low-income group (Camfield *et al.*, 2010; Easterlin, 2005). Thus, the view taken by these scholars is that while increases in absolute income can help in the way of meeting the minimum needs of poor communities, as the communities become richer, other income measures (such as relative income) play an important role in explaining SWB.

Although no widespread consensus exists on the effect that relative income might have on SWB, there is some agreement that relative income correlates positively to SWB. Using fixed effects and clustered fixed effects, Posel and Casale (2011) examined the relative standing and SWB in South Africa. Making use of panel data from the National Income Dynamics Study (NIDS), they found that an individual's relative standing in his village and/or suburb has a greater effect on well-being than his relative standing compared to the rest of South Africa. Posel and Casale (2011) also found that comparing oneself with others has a significant impact on life satisfaction. Those who believe to be a part of the middle and richest third of income earners have greater levels of SWB than those who would say they fall within the poorest third of income earners. They also disaggregated the model to determine how belonging to different ethnic groups impacts SWB due to South Africa's political past. They found that Black people believe themselves to be in a lower class and report having far lower levels of SWB compared to Whites.

TABLE 1 - *Selected Findings from Panel and Cross-Sectional Studies*

	Author(s)	Ferrer-i-Carbonell (2005)	Clark & Oswald. (1994)	Bian & Xiao (2014)	Cramm & Nieboer (2012)	Winkelmann & Winkelmann (1998)	Posal & Casale (2011)
Explanatory variables	Data-type	Panel data	Panel data	Cross-section	Cross-section	Panel data	Panel data
<i>age</i> ,		–&significant	–&significant	+&significant	+&insignificant	–&significant	–&significant
<i>AgeSQ</i>		+&significant	+&significant	N/A	N/A	+&significant	+&significant
<i>Gender(Male)</i>		–&significant	+ &significant	–&significant	+&insignificant	–&significant	+ &significant
<i>Marital status(married)</i>		+ &significant	+ &significant	+ &significant	+&significant	+ &significant	+ &significant
<i>Race (Blacks)</i>		N/A	+&significant	N/A	N/A	N/A	– & significant
<i>Education level</i>		+&insignificant	– & significant	+ &significant	+&significant	N/A	+&insignificant
<i>Income</i>		+ & significant	N/A	N/A	+ & significant	+&insignificant	+&insignificant
<i>Health (excellent/good)</i>		N/A	+ & significant	+&significant	+& significant	+ & significant	+ & significant
<i>Unemployment</i>		– & significant	– & significant	+ &insignificant	– & insignificant	– & significant	– & significant

*Notes:*

–&amp;significant means negative and significant

+&amp;significant means positive and significant

–&amp;insignificant means negative and insignificant

+&amp;insignificant means positive and insignificant

*Source:* Authors own based on these past studies.

Papers using age and ageSQ include studies by Ferrer-i-Carbonell and Frijters (2004); Clark and Oswald (1994); Posal and Casale (2011) and Winkelmann and Winkelmann (1998). The results for the age-SWB relationship remains unclear – some suggest that SWB falls as the individuals become older (Smith and Baltes, 1998), while others find that it increases as the age rises. The decline in SWB as individuals become older is attributable to many factors such as losing friends, drop in financial resources, health-related problems. Some studies indicate that self-employed individuals tend to demonstrate higher levels of well-being (van der Zwan *et al.*, 2018; Fritsch *et al.*, 2018; Bencsik and Chuluun, 2021; Warr, 2018; Suppa, 2021). For example, in his recent study Warr (2018) found that job satisfaction tends to be higher among self-employed individuals compared to those working within organizations, particularly among those who do not hold supervisory roles. He also found that self-employed individuals consistently report significantly higher levels of achievement in their lives, and this contrast is once more observed exclusively among workers who do not have supervisory responsibilities. Other related papers in South Africa (Arogundade *et al.*, 2021; Mosikari *et al.*, 2019; Phiri, 2019 and Biyase *et al.*, 2022) have touched on important factors that can indirectly affect SWB.

### 3. METHODOLOGY

#### *Data Source*

We investigate the relationship between occupation status and SWB in South Africa by drawing on the data from the NIDS. The NIDS was first conducted in 2008, with a representative of 7300 households. The same respondents were interviewed in subsequent years in 2008, 2010, 2012, 2014 and 2017 respectively. The NIDS contains rich information on individuals such as occupational status, migration, SWB, income, health, education, household composition and structure and other related information. This study used the merged database and focused on the adult questionnaire, that interviewed individuals aged 15 and older. The dependent variable of interest is SWB, which is measured in the NIDS by asking the respondents to answer the following 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?” Our independent variable of interest is a dummy which distinguishes between high skill and low skill workers. This is derived from the International Standard Classification of Occupations 1-digit classification, where high-skilled occupations include the following categories: armed forces occupations; managers; professionals; technicians and associate professionals; skilled agricultural; forestry and fish; craft and related

trades workers. While the low skill includes clerical support; service and sales workers; plant and machine operators, and assembly and elementary occupations.

We also take into account other variables that are deemed important in explaining the SWB. These include gender (1= female or 0 otherwise); age in years; education in years; population group ('Black/African', 'Coloured', 'India' and 'White'). Geo-type ('Traditional areas', 'Urban areas' and 'Farm areas'), province or region ('Western Cape', 'Eastern Cape', 'Northern Cape', 'Free State', 'Kwa-Zulu Natal', 'North West', 'Gauteng', 'Mpumalanga', and 'Limpopo'). The rest of the control variables are marital status ('Married', 'Living with partner', 'Widow', 'Divorced' and 'Never married'); health status ('Excellent', 'Very good', 'Good', 'Fair' and 'Poor'). These variables as well as their descriptions are listed in Table 2 below.

TABLE 2 - *Explanatory Variables used in The Empirical Analysis*

<i>Variables</i>	<i>type</i>	<i>Description</i>
<b><i>Dependent variable</i></b>		
<i>Life satisfaction</i>	Categorical	1=Very dissatisfied, 2=2, 3=3, 4=4, 5=5, 6=6, 7=7, 8=8, 9=9, 10=Very satisfied
<b><i>Explanatory variables</i></b>		
<i>Skill level</i>	Dummy	0=Low skilled, 1=High skilled
<i>Income</i>	Continuous	Income wage of the individual
<i>Age</i>	Continuous	Age of the individual (in years)
<i>Age Squared</i>	Continuous	Ages squared
<i>Household size</i>	Continuous	Total number of members in the household
<i>Education</i>	Continuous	Highest level of education obtained
<i>Race</i>	Dummy	Black (1/0), Coloured (2/0), Asian/ Indian (3/0), White (4/0)
<i>Geography type</i>	Dummy	Traditional (1/0), Urban (2/0), Farms (3/0)
<i>Gender</i>	Dummy	0=Male, 1=Female
<i>Marital status</i>	Dummy	Married (1/0), Living with partner (2/0), Widow (3/0), Divorced (4/0), Never married (5/0)
<i>Health status</i>	Dummy	Excellent (1/0), Very good (2/0), Good (3/0), Fair (4/0), Poor (5/0)
<i>Province</i>	Dummy	Western Cape (1/0), Eastern Cape (2/0), Northern Cape (3/0), Free State (4/0), KwaZulu-Natal (5/0), North West (6/0), Gauteng (7/0), Mpumalanga (8/0), Limpopo (9/0)

*Source:* Authors' own creation from the NIDS database (2008- 2017).

### *Data Analysis*

This study incorporates quantitative measures to analyse the relationship between the SWB and the explanatory variables (Creswell, 2019), thereby determining the relationship between the dependent variable (in this study, the individuals' SWB) and the explanatory variables (in this study, skill level, income, age, age squared, household size, education, race, geography, gender, marital status, health status and province) within a population. Descriptive statistics are incorporated to analyse the relationships between variables (Bijou *et al.*, 1968).

To appreciate the relationship between occupation and SWB a REOP is first employed; a model frequently used in existing literature (see Biyase *et al.*, 2020). The model in equation 1 is estimated using ordered probit as it reflects the ordinal nature (in a panel setting) of the dependent variable of interest. Within this framework, an attempt was made to estimate various models, with SWB as a dependent variable of interest.

Four REOP models are provided, in the form of a marginal coefficient graph (Table 4). The first Model 1 include the log of income, age, age squared, household size, geography, gender, marital status, health status, and province. The second model will include SWB of low- and high-skilled occupations by adding the variable "occupation" as the main independent variable to the base variables from Model 1. The third model builds onto Model 2 and includes race to determine whether it still has an impact in South Africa's occupations given the history of South Africa's labour market during the apartheid era. The fourth model builds onto Model 3 and adds the interaction of the race and occupation skill level; these four models are then compared to see how occupation skills level and race impact the SWB of labourers. The REOP model will be specified as follows (Long and Freese, 2006; Ferrer-i-Carbonell and Frijters, 2004):

$$y_{it}^* = x_{it}\beta + \varepsilon_{it} \quad (1)$$

where  $y_{it}^*$  represents the 10-point satisfaction scale that is used as a proxy variable for SWB of individuals  $i$  at year  $t$ ,  $x_{it}$  is a vector that represents all the SWB determinants (identified from previous SWB studies and includes occupations),  $\beta$  represents the vector of unknown parameters and  $\varepsilon_{it}$  is the error term.

The ones estimated from the REOP, however, may mask the variability in the estimates. The conventional regressions are focussed on the mean which may over- or under-estimate the



coefficient estimates or may even fail to highlight important relationships, whereas quantile regressions are able to describe the entire conditional distribution of the dependent variable (Binder and Coad, 2011). In view of this, the quantile regression technique is incorporated to examine whether the key results change. The models in this study will focus on the results from the 25, 75 and 90<sup>th</sup> quantiles.

Four quantile regression models are provided. These models will use SWB as the dependent variable and will analyse the typical variables found in SWB studies. These base variables include the log of income, age, age squared, household size, geography, gender, marital status, health status, and province. The first quantile regression model (Model 5) excludes low- and high-skilled occupations in order to provide a quantile regression model that represents what has been done in past SWB studies. The second quantile model (Model 6) will include SWB of low- and high-skilled occupations by adding the variable “occupation” as the main independent variable to the base variables from Model 5. The third quantile model (Model 7) includes these base variables and adds race to determine whether it still has an impact on South Africa’s occupation skill level given the history of South Africa’s labour market during the apartheid era and Model 8 adds the interaction of the race variable with the occupation skill level to the base variables from the other three models. These models are then compared to see how occupation skills level and race impact the SWB of labourers.

The quantile regression is used to obtain a more complete picture of the factors that affect individual’s SWB at different distribution levels. The data is split into quantile groups to give a more in-depth explanation of each group in terms of their SWB. The use of panel data techniques allows more reliability in identifying the individual’s SWB and provide precise parameter estimation due to a bigger sample size (Hsiao, 2005). Moreover, the quantile regression technique is more robust to outliers (Fang and Niimi, 2017) and can be described as a semi-parametric estimator as it relaxes the assumption that the error terms are identically distributed at all points of the conditional distribution and therefore acknowledges individual heterogeneity (Binder and Coad, 2011).

The quantile regression model can be stated in the equation introduced by Koenker and Bassett (1978) as follows:

$$y_{it} = x'_{it}\beta_{\theta} + u_{\theta it} \text{ with } Quant_{\theta}(y_{it}|x_{it}) = x'_{it}\beta_{\theta} \quad (2)$$

where  $y_{it}$  is the dependent variable (SWB),  $x'_{it}$  is a vector of regressors also known as the explanatory variables,  $\beta$  is the vector of parameters and  $u$  is the vector of residuals.

The results of the quantile regression models will be presented in a marginal coefficient plot figure 3 and figure 4 while the entire tabular estimates are reported in the appendix. In this way the models are presented in a “snap-shot” to be able to compare the four models with more ease. In other words, the individuals self-reporting well-being could be influenced by an unexpected accident that could reduce the individual’s SWB. For this reason, the regression results should be interpreted with caution as it does not necessarily capture causal effects.

### *Descriptive Statistics*

Table 3 provides the descriptive statistics for the variables used in the four models and breaks the descriptive statistics into the low-skilled and high-skilled occupations. Table 3 shows that the SWB was stated in the form of a Likert Scale question where individuals had to choose how satisfied they are with life on a scale from 1 to 10. In this table it shows that the high-skilled occupation individuals tend to be on average more satisfied (5.8) than the low-skilled average (5.4). Furthermore, the table agrees with the literature in that high-skilled occupations pay higher incomes on average (9.2) than the lower-skilled occupation average (8.6).

Table 3 indicates that high-skilled occupation ages tend to be older on average (38 years of age) and have more years of educational training (15 years of education) than the low-skilled occupation individuals who are on average 37 years of age and 12 years of education.

In terms of the geography, Table 3 indicates that the higher-skilled occupations are found in urban areas whereas the lower-skilled occupations are more situated in the farms or rural areas. This is also confirmed when looking at provinces where the high-skilled occupations are situated in provinces that are more urbanised such as Gauteng and that the low-skilled occupations are more situated in rural or farm provinces such as Free State and Northern Cape. The results further support past studies and confirm that males still dominate the high-skilled occupations and that on average more females are found in the low-skilled occupations.

TABLE 3 - *Descriptive Analysis*

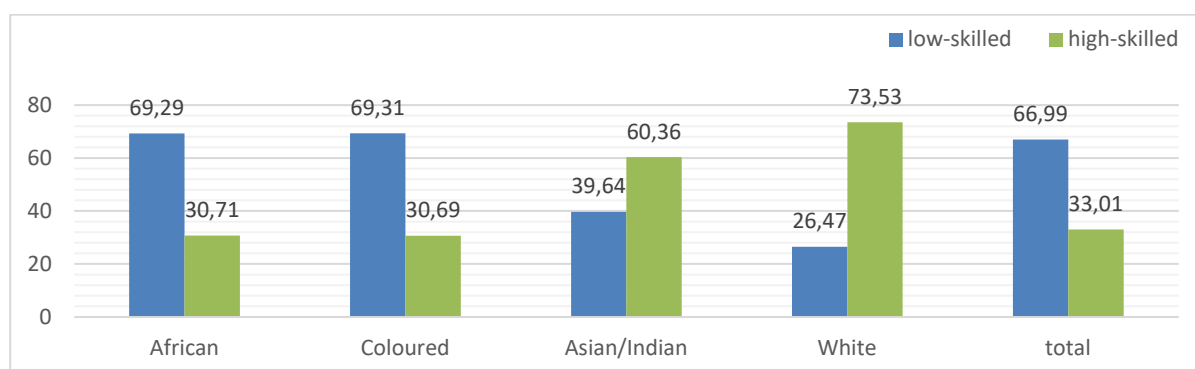
	High skilled				Low Skilled			
<i>Variable</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
SWB	5.889586	2.289437	1	10	5.439263	2.35041	1	10
loginc	9.272601	0.952081	5.298317	12.8028	8.630062	0.814241	4.60517	13.83129
age	38.19976	11.21791	18	82	37.2252	11.23818	18	78
agesq	1585.045	912.9404	324	6724	1512.003	904.5019	324	6084
hhsizer	4.216867	2.833729	1	31	4.674364	3.267627	1	31
Education	14.86821	5.034414	1	32	11.7645	5.168814	-9	29
Geo_Type								
Urban	0.72542	0.446336	0	1	0.633751	0.4817963	0	1
Farms	0.055481	0.228934	0	1	0.125651	0.3314673	0	1
gender	0.467202	0.49896	0	1	0.532586	0.4989553	0	1
Marital status								
Living with partner	0.089719	0.2858	0	1	0.119674	0.3245923	0	1
Widower	0.034519	0.182571	0	1	0.050891	0.2197831	0	1
Divorced	0.04791	0.213591	0	1	0.027939	0.1648033	0	1
Never married	0.428359	0.494878	0	1	0.519176	0.4996505	0	1
Health								
Very good	0.314146	0.464209	0	1	0.328568	0.4697098	0	1
Good	0.249145	0.43255	0	1	0.268016	0.442942	0	1
Fair	0.051465	0.220961	0	1	0.055495	0.2289512	0	1
Poor	0.007735	0.087613	0	1	0.012902	0.1128572	0	1

*Source:* NIDS database (2008-2017).

Finally, individuals who were never married are on average more situated in the low-skilled occupations and that more married individuals fall into the skilled-occupations. This could be because they have a family to support and would therefore be more motivated to have a high-skilled job that comes with a higher income to support their family. Health shows that the healthier individuals tend to hold the high-skilled occupations that can afford health care whereas the low-skilled individuals describe their health more as fair as they may not be able to afford the best health care.

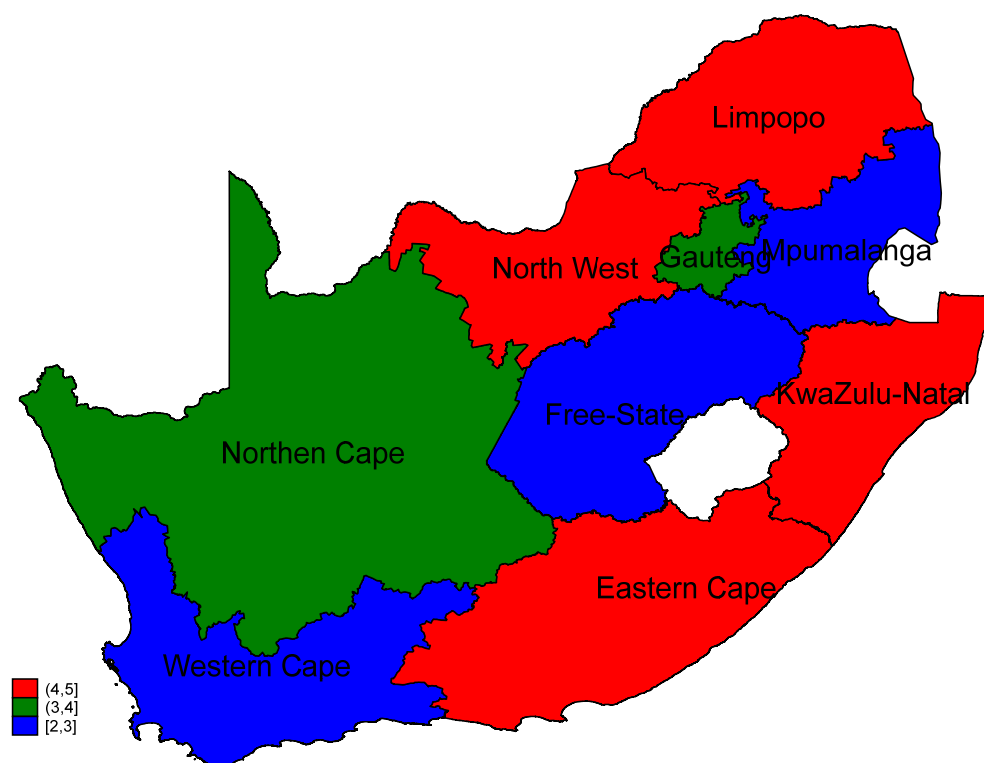
Figure 1 shows the relationship amongst the different race groups to the occupation skill level and indicates that 27 years post-Apartheid, there are still huge differences amongst previously disadvantaged groups in terms of the level of skills in each occupation.

FIGURE 1 - *Race and Occupation Skill Level*



*Source:* Authors' own creation based on NIDS database.

Overall, there are more individuals in a low-skilled occupation (66.9%) than in a high-skilled occupation (33%). This agrees with past literature that South Africa's labour force is characterised by low-skilled workers. Figure 1 further indicates that Blacks have the highest percentage of low-skilled occupation (69.2%), followed by Coloureds (69.3% of low-skilled occupation), whereas Whites have most of the high-skilled occupation (73.5%), followed by Asian/ Indians (60.3% that are in high-skilled occupations). Interestingly this is different to what He *et al.* (2019) found in America, where Asians were generally more represented in highly skilled jobs and Blacks and Hispanics had more representation in lower skilled occupations.

FIGURE 2 - *SWB Distribution across South African Provinces 2008*

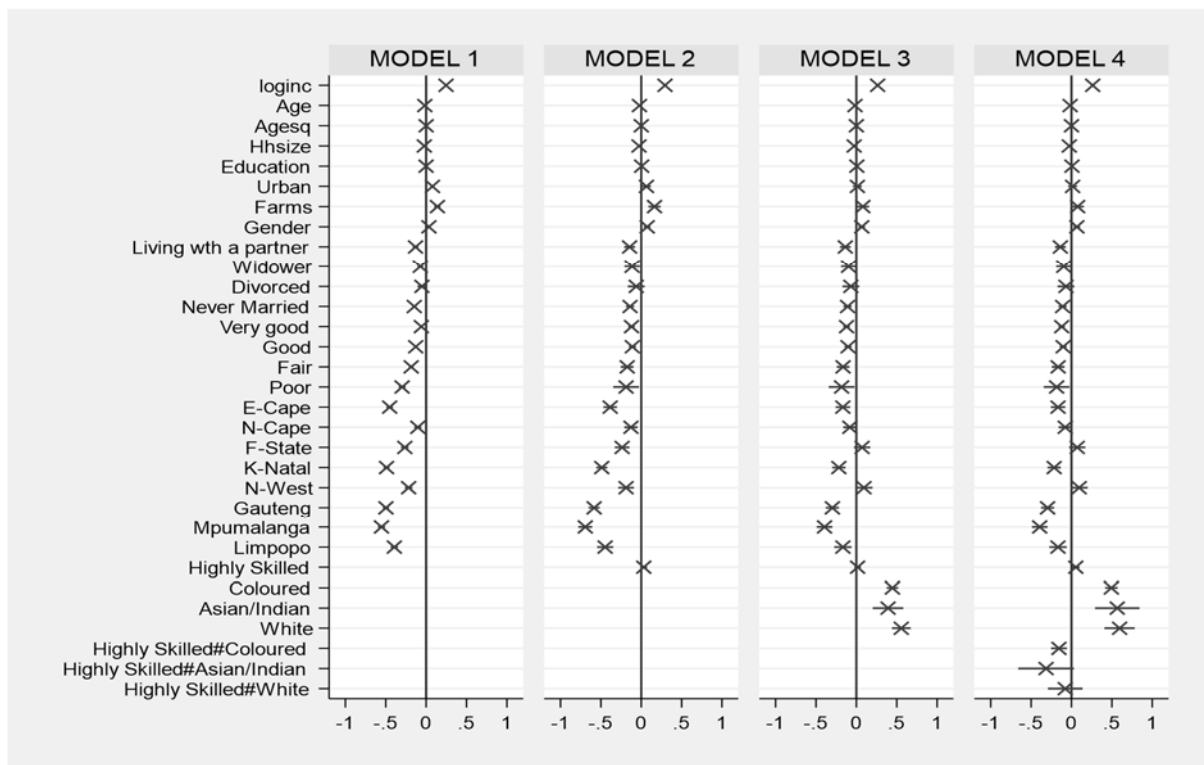
*Source:* Authors' own creation based on NIDS database (2008).

#### 4. EMPIRICAL RESULTS

The empirical analysis attempts to dig deeper to see if the patterns revealed by the descriptive analysis continue when considering additional covariates. As a way of setting the scene, the baseline regression results are presented in Figure 3 and Table 4 by employing the REOP to estimate equation 1. As noted in the empirical section, Model 1 of Figure 3 only regresses SWB on standard determinants of SWB excluding the effects race, interacted effects and occupation. The preliminary findings based on Model 1 produce anticipated results in terms of signs and significance level – married individuals were significantly more likely to be happier than those that are not married (i.e. living with partner, widower, divorced and never married), in accordance with previous findings (Blanchflower and Oswald, 2004) that being married enhances individual well-being. Furthermore, females are happier than males, confirming findings of existing studies such as Mookerjee and Beron (2005). This finding is however not entirely universal as some

studies report that females are less happy compared to males (Clark and Oswald, 1994), while other studies (Sulemana, 2015) report neutral effect of gender on SWB.

FIGURE 3 *Marginal Coefficients Graph of the Random Effect Ordered Probit Models*



Source: NIDS database (2008-2017).

Similar to Blanchflower and Oswald (2004), this study found a U-shaped link between age and SWB, suggesting that there is a non-linear effect of age on SWB. The coefficients of income are positively related to SWB, in line with the findings of previous studies (e.g., Kingdon and Knight, 2007; Luttmer, 2005; McBride, 2001; Posel and Casale, 2011). Similar to past literature, the REOP estimates show that compared to traditional rural areas, individuals living in urban and farms areas are happier. These estimates accord with previous studies, especially those carried out in Africa where rural dwellers are more likely to be poor than urban dwellers.

Model 2 figure 3 reports the results when SWB is regressed on the independent variable of interest, while controlling for the standard covariates. Consistent with previous studies, occupation is positively associated with SWB. The standard determinants from Model 1 have

similar results in Model 2. This suggests that the relationship found in Model 1 is not sensitive to the inclusion of the variable of interest (occupation status).

Model 3 includes the effect of race, which proves to be important in explaining SWB. Specifically, in comparison with other population groups (Whites, Indians and Coloureds) Blacks are less likely to be happier (Posel and Casale, 2011). Once again, the estimated coefficients of the control variables seem to enter the model as expected and in line with Model 1 and Model 2.

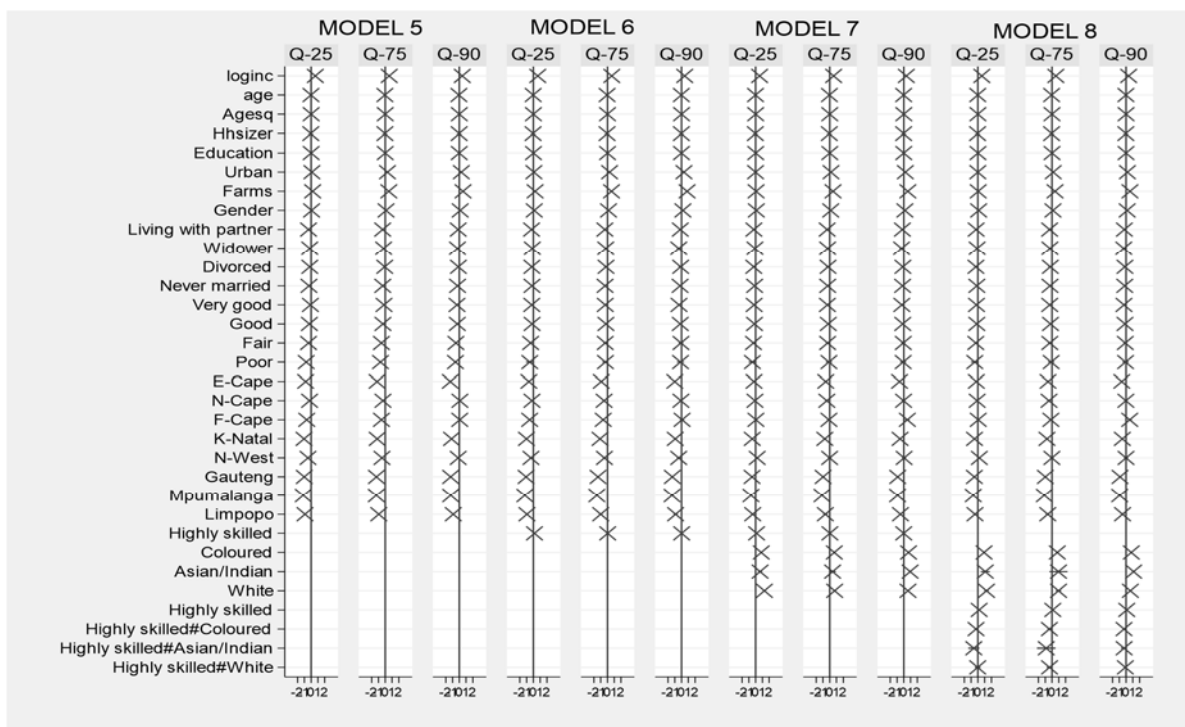
Building on the first, second and third models, Model 4 incorporates the interaction terms between race and occupation variables. It is interesting to note that when all covariates are included in the model, occupation becomes statistically significant. Perhaps surprisingly, the interacted effect between race and occupation is negative, suggesting that race weakens the positive relationship between occupation and SWB. In other words, in comparison to Blacks, other race groups have a more noticeable negative relationship between occupation and SWB. A possible explanation for this could be that, previously, Blacks did not have the opportunity to study, gain skills and work in highly skilled occupations, and since apartheid ended more opportunities have opened for Blacks to study, gain skills and have access to highly skilled occupations. Understandably, it seems that Blacks attach more importance to job status (and skill level) than other races do because they may be the first or second generation of their family to be able to hold occupations with status that require more skills, which explains their higher scores of SWB. This finding differs from a study by Tuch and Martin (1991) who found that overall African Americans had lower scores of SWB and lower job satisfaction than the White American workers.

Up to now, we have analysed the occupation status-SWB nexus based on REOP. Unsurprisingly, the REOP are similar to past SWB studies. However, one of the key contributions of this study is to estimate the effect of occupational status on SWB using an estimator (quantile regression) that accounts and verify whether the observed positive relationship varies along the conditional SWB distribution. Table 5 and Figure 4 present the quantile regression results which provide a more complete picture of the factors that affect the individual's SWB.

Models 5 to 8 present the results derived from quintiles 25, 75 and 90, respectively. The 25th quantile of SWB distribution represent respondents with the lowest quantile of the SWB distribution, while quantile 90th represent those with highest quintile of the distribution. Model 5 includes neither the variable of interest (race), nor the interaction effect. The results from

Model 5 largely resemble those from the REOP regression in terms of statistical significance and the sign of the coefficients. Almost all the estimated quantile regression coefficients (similar to REOP) enter these regressions significantly with predicted sign, as previously displayed. Unlike the REOP case, we observe a monotonic decrease of the effect of income over the quantiles. Specifically in the unhappiest 25% of the sample, becoming affluent more than doubles the impact than in the REOP case ( $0.614706^{***}$ ), while the happiest individuals in the sample (90%) almost double the impact ( $0.435386^{***}$ ) compared to the REOP case. We observe a similar pattern with household size – monotonic fall in the effect of household size over the quantiles of the SWB distribution. Regarding the unhappiest 25 % in the sample, having a big family leads to a big decrease in the SWB ( $-0.0531^{***}$ ) compared to the REOP case ( $0.02235$ ), while the happiest 90% in the sample experience almost a similar impact ( $-0.02443^{***}$ ) as in the REOP case ( $-0.02235$ ). Looking at the other estimated coefficients in the analysis reveals a relatively similar pattern and clearly demonstrates that ignoring the heterogeneity across the SWB distribution will lead to biased results.

FIGURE 4 - *Marginal Coefficients Graph of the Quantile Regressions*



Source: NIDS database (2008-2017).



Model 6 of Figure 4 shows that the coefficients for the standard variables are mostly stable across the three quantile groups. In other words, these variables commonly affect the SWB of the respondents irrespective of their SWB levels. Model 5 (which adds variable of interest) reveals notable variations in the observed effects across the quantiles. While occupation is significant for the lowest tails of SWB distribution (at Q-25), the coefficient becomes insignificant for the higher quantiles (Q-75 and Q-90). While the relationship is similar for the Q-75 and Q-90 as in REOP regression model, it is dissimilar for the Q-25. What this means is that REOP model underestimates this effect of occupation at the Q-25. Moreover, the effect of occupation on the SWB in quantile regression is non-identical between individuals with higher levels of SWB and individual with lower levels, as the coefficient for the 25th quantile is relatively higher than those in the higher quantiles. A similar pattern is observed with education: while REOP models do not show a significant effect on SWB, the quantile estimates display a positive and significant effect at the lower SWB quantiles (Q-25) and a negative association at the high levels of the SWB distribution (Q-90). This finding is in line with the results from Binder and Coad (2011), who found education to be positively related with SWB at lower quantiles but negatively related at the upper quantiles.

Model 7 incorporates race effect plus interacted effect of race and suggests that the effect of these variables on SWB is mostly consistent, regardless of the regression models (REOP or quantile regression). Thus, quantile estimates offer no evidence of differences regarding the effect of race dummies on SWB distribution. Interestingly the variable occupation across the remaining models is significant only for the lowest trail of SWB distribution (at Q25) and becomes insignificant for the highest quantile (Q90). It is also notable that the significance of occupation (our variable of interest) is not all that influenced by the inclusion of the race and interacted variables in our model. However, what emerges from the quantile estimates is that paying too much attention to average effects can conceal a substantial heterogeneity across the SWB distribution.

## 5. CONCLUSION

In the last decade there has been a growing interest in behavioural-science theory and research to determine the causes, consequences, and the extent of job satisfaction. This study adds to that body of research by studying the SWB of different occupations positions associated with different

levels of skills required. This paper further adds to the research by focusing on the interaction between race and occupation status and the impact it has on the workers SWB.

This study makes use of all five waves of the National Income Dynamics Study (NIDS) collected between 2008 and 2017 and has a sample size of 19 126 observations. The dependent variable is the level of the respondents' self-reported life satisfaction which was used as a proxy to represent the individual's SWB. With this dependent variable, the aim of the study was to compare the SWB of individuals based on their occupation's level of skill required.

To show the relationship between occupation and SWB, as found in past studies, a REOP model is first employed with SWB as a dependent variable of interest. Model 1, that includes just the standard variables produced anticipated results similar to past literature in terms of signs and significance. Model 2 added the variable of interest (occupation) and showed that a higher skilled occupation yields higher SWB and that the standard variables from Model 1 is not sensitive to the inclusion of the variable of interest. Model 3 includes the effect of race, which proved to be important in explaining SWB and indicates that Blacks are less likely to be happier. Model 4 incorporates the interaction terms between race and occupation variable which interestingly notes that when all covariates are included in the model, occupation becomes statistically significant. Perhaps surprisingly, the interacted effect between race and occupation is negative, suggesting that race weakens the positive relationship between occupation and SWB.

The quantile regression models were then provided to obtain a more complete picture on the relationship between occupation and SWB by considering the possibility that the effect of occupation might differ across the SWB distribution conditional on observable factors. Model 5 largely resembles the results from the REOP regression in terms of statistical significance and the sign of the coefficients. Model 6 incorporates race effects and suggests that the effect of race dummies on SWB is mostly consistent, regardless of the regression model (REOP or quantile regression). Thus, quantile estimates offer no evidence of differences regarding the effect of race dummies on SWB. However, what emerges from the quantile estimates is that paying too much attention to average effects can conceal a substantial heterogeneity across the SWB distribution. The research findings have significant policy implications for understanding the relationship between occupation status and subjective well-being (SWB) in South Africa. The study highlights the positive association between occupation and SWB, consistent with existing literature.

However, the analysis reveals a more nuanced picture, indicating that the impact of occupation is most pronounced in the lower to slightly upper segments of the SWB distribution (Q25 and Q75).

This distributional influence implies that policies aimed at improving well-being among individuals in the lower quantiles of the SWB distribution may benefit from focusing on employment opportunities and support in accessing meaningful occupations. Efforts to address unemployment and create job opportunities could positively impact SWB for this segment of the population.

While the research provides valuable insights into the relationship between occupation status and subjective well-being (SWB) in South Africa, it is essential to acknowledge certain limitations in the analysis that may affect the interpretation of the findings. Subjective Well-Being Measurement: the assessment of SWB is inherently subjective and influenced by individual perceptions and experiences. Although the study uses standard measures to capture SWB, there could still be inherent biases or variations in responses that might not fully capture the nuances of well-being.

Future research should consider investigating the effect of occupation status on SWB for males and females and explore whether the relationship varies by occupations (skilled, semi-skilled and low-skilled levels).

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## APPENDIX



TABLE 4 - *Random Effect Ordered Probit Estimates of the Effect of Occupation on SWB*

SWB	Model I		MODEL II		MODEL III		MODEL IV	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
<i>Highly Skilled (low skilled=omitted)</i>			0.0330	0.0208	0.0174	0.0208	0.0541**	0.0237
<i>Log income</i>	0.246727	0.004759***	0.2920***	0.0122	0.2619***	0.0124	0.2608***	0.0124
<i>Age</i>	-0.01654	0.001512***	-0.0238***	0.0058	-0.0186***	0.0057	-0.0184***	0.0057
<i>AgeSq</i>	0.00017	0.000016***	0.0003***	0.0001	0.0002***	0.0001	0.0002***	0.0001
<i>HH-size</i>	-0.02235	0.001418***	-0.0277***	0.0033	-0.0274***	0.0033	-0.0273***	0.0033
<i>Education</i>	-0.00056	0.000796	0.0053***	0.0020	0.0060***	0.0020	0.0060***	0.0020
<i>Geo-Type (Rural=omitted)</i>								
<i>Urban</i>	0.078563	0.01281***	0.0663**	0.0282	0.0144	0.0283	0.0159	0.0283
<i>Farms</i>	0.139728	0.019946***	0.1642***	0.0389	0.0805*	0.0392	0.0756*	0.0393
<i>Gender</i>	0.034904	0.01004**	0.0760***	0.0206	0.0694***	0.0204	0.0689***	0.0204
<i>Marital status (Married=omitted)</i>								
<i>Living with partner</i>	-0.13125	0.018006***	-0.1411***	0.0340	-0.1340***	0.0338	-0.1350***	0.0338
<i>Widower</i>	-0.07195	0.018464***	-0.1240**	0.0479	-0.1076*	0.0477	-0.1068*	0.0477
<i>Divorced</i>	-0.05201	0.028829*	-0.0600	0.0531	-0.0646	0.0529	-0.0650	0.0529
<i>Never Married</i>	-0.14643	0.0135***	-0.1398***	0.0260	-0.1102***	0.0260	-0.1107***	0.0260
<i>Health status (Excellent health=omitted)</i>								
<i>Very good</i>	-0.05928	0.010415***	-0.1212***	0.0206	-0.1223***	0.0205	-0.1224***	0.0205
<i>Good</i>	-0.12915	0.010937***	-0.1074***	0.0221	-0.1006***	0.0221	-0.1008***	0.0221
<i>Fair</i>	-0.18473	0.015618***	-0.1743***	0.0398	-0.1653***	0.0397	-0.1660***	0.0397
<i>Poor</i>	-0.29713	0.021843***	-0.1758*	0.0810	-0.1710*	0.0807	-0.1722*	0.0807
<i>Time dummy</i>	YES		YES		YES		YES	
<i>Race (Africans = Omitted)</i>					YES		YES	
<i>Interaction</i>							YES	
<i>Observations</i>	18 920		18 920		18 920		18 920	

Dependent variable= Subjective Well-Being. Statistically significant at 0.01\*\*\*, 0.05\*\* and 0.10\*

TABLE 5 - *Basic Quantile Regression (Excludes Occupation)*

SWB	Model V		
	Q25	Q75	Q90
Log income	0.614706 (0.01146)***	0.59048 (0.013745)***	0.435386 (0.013926)***
Age	-0.02351 (0.003403)***	-0.05281 (0.004266)***	-0.05927 (0.004172)***
AgeSq	0.000238 (3.62E-05)***	0.000556 (0.000045)***	0.000647 (3.81E-05)***
HH-size	-0.0531 (0.003279)***	-0.04835 (0.004462)***	-0.02443 (0.005415)***
Education	0.000923 (0.001716)	-0.00289 (0.00216)	-0.01203 (0.002507)***
Geo-Type (Rural=omitted)			
Urban	0.103957 (0.028342)***	0.326399 (0.036368)***	0.293708 (0.043521)***
Farms	0.223168 (0.043599)***	0.528093 (0.0563)***	0.546581 (0.081401)***
Gender	0.062339 (0.021698)**	0.118265 (0.02628)***	0.133845 (0.029912)***
Marital status (Married=omitted)			
Living with partner	-0.38721 (0.038761)***	-0.37878 (0.054128)***	-0.16328 (0.068144)**

TABLE 5 - *continued*

SWB	Model V		
	Q25	Q75	Q90
Widower	-0.20429 (0.041408)***	-0.23745 (0.052888)***	-0.27512 (0.053956)***
Divorced	-0.20315 (0.087531)**	-0.07405 (0.101401)	-0.13875 (0.059931)**
Never Married	-0.32884 (0.030689)***	-0.36946 (0.035983)***	-0.26157 (0.046509)***
Health status (Excellent health=omitted)			
Very good	-0.1128 (0.026939)***	-0.18262 (0.03317)***	-0.34547 (0.036173)***
Good	-0.26388 (0.027738)***	-0.33926 (0.034092)***	-0.29404 (0.043371)***
Fair	-0.38764 (0.039082)***	-0.56716 (0.053718)***	-0.50466 (0.067433)***
Poor	-0.72988 (0.059161)***	-0.70589 (0.072204)***	-0.57835 (0.104899)***
Constant	0.368863 (0.132044)**	4.280838 (0.1601)***	7.170078 (0.171214)***
Time dummy	YES	YES	YES
Observations	77 864	77 864	77 864

Dependent variable= Subjective Well-Being. Statistically significant at 0.01\*\*\*, 0.05\*\* and 0.10\*.

TABLE 6 *Quantile Regression Models (Includes Occupation)*

SWB	Model VI			Model VII			Model X		
	Q25	Q75	Q90	Q25	Q75	Q90	Q25	Q75	Q90
<i>Highly Skilled (low skilled=omitted)</i>	0.159307 (0.045269)***	0.033194 (0.055432)	0.014645 (0.054251)	.1345461 (.0432353)**	.0358374 (.0590622)	.0050175 (.0457499)	.1862866 (.0510383)***	.1218325 (.0667207)*	.1013086 (.0725012)
<i>Log income</i>	0.643648 (0.026307)***	0.633027 (0.031416)***	0.466849 (0.030504)***	.5804328 (.0253622)***	.5708162 (.035427)***	.3709777 (.0284898)***	.5808984 (.0258414)***	.5706957 (.0341642)***	.3698038 (.0297038)***
<i>Age</i>	-0.033343 (0.012413)**	-0.05575 (0.013053)***	-0.03162 (0.012282)***	(-.0204344) (.0118273)*	(-.0557771) (.0150326)***	(-.02852) (.0115282)**	(-.0194475) (.0118117)*	(-.0622391) (.145845)***	(-.0294634) (.0110083)**
<i>AgeSq</i>	0.000397 (0.000154)***	0.000604 (0.000153)***	0.000329 (0.000137)**	.0002329 (.0001454)	.0005976 (.0001819)***	.0002744 (.0001334)**	.0002212 (.00014646)	.0006856 (.0001745)***	.000278 (.0001253)**
<i>HH-size</i>	-0.049978 (0.006931)***	-0.06431 (0.00806)***	-0.03076 (0.010508)**	(-.0477755) (.0065786)***	(-.0610351) (.0092256)***	(-.030459) (.0099004)**	(-.0484285) (.0065731)***	(-.0590577) (.0092762)***	(-.0294919) (.0099349)**
<i>Education</i>	0.011835 (0.003945)**	0.006157 (0.004884)	-0.01059 (0.004799)**	.013912 (.0037063)***	.0096487 (.0053218)*	(-.0057847) (.0044072)	.0130385 (.0037928)***	.1010936 (.0051082)**	(-.0051647) (.0045645)
<i>Geo-Type (Rural=omitted)</i>									
<i>Urban</i>	0.07061 (0.056111)	0.307605 (0.071462)***	0.354969 (0.073863)***	(-.0090741) (.0551918)	.1880288 (.0764132)**	.2240763 (.0724977)**	(-.0097375) (.0571275)	.1865789 (.0746451)**	.2203499 (.0740274)**
<i>Farms</i>	0.245178 (0.072912)***	0.593882 (0.101289)***	0.816932 (0.095463)***	.0733262 (.0733483)	.4983114 (.1097745)***	.5895643 (.0869164)***	.0447605 (.0730571)	.4522703 (.1091160)***	.5616763 (.0942336)***
<i>Gender</i>	0.127405 (0.041319)**	0.152341 (0.050624)**	0.202449 (0.048985)***	.1067484 (.039448)***	.1577007 (.0542156)**	.1670068 (.0406981)***	.1084723 (.0396211)**	.1541494 (.052545)**	.1724957 (.04576)***
<i>Marital status (Married=omitted)</i>									
<i>Living with partner</i>	-0.272592 (0.075831)***	-0.38808 (0.098472)***	-0.18935 (0.090249)**	(-.2506379) (.0682765)***	(-.3717743) (.1100924)***	(-.2135021) (.0867978)**	(-.2557798) (.0691248)***	(-.3426116) (.1056966)***	(-.2200472) (.0879156)**

TABLE 6 – *continued*

SWB	Model VI			Model VII			Model X		
	Q25	Q75	Q90	Q25	Q75	Q90	Q25	Q75	Q90
<i>Widower</i>	-0.160027 (0.089551)*	-0.2589 (0.09765)**	-0.41223 (0.147618)**	(-.1175672) (.0810026)	(-.3286575) (.0925893)***	(-.4087308) (.1635884)**	(-.1231085) (.0904283)	(-.3165114) (.100905)**	(-.3657632) (.1026657)***
<i>Divorced</i>	-0.225836 (0.118548)*	-0.21762 (0.13891)	-0.13479 (0.16614)	(-.2742249) (.1084495)**	(-.2219792) (.1559442)	(-.1155021) (.1134027)	(-.2711624) (.1057016)**	(-.2458925) (.1445587)*	(-.1481281) (.0839462)*
<i>Never Married</i>	-0.207045 (0.05462)***	-0.35925 (0.068634)***	-0.21934 (0.064008)***	(-.1621993) (.0510691)***	(-.3141573) (.0737034)***	(-.1992695) (.0547482)***	(-.1489578) (.0518296)**	(-.2916206) (.0701499)***	(-.190977) (.0634566)**
<i>Health status (Excellent health=omitted)</i>									
<i>Very good</i>	-0.239553 (0.048617)***	-0.32951 (0.058781)***	-0.37718 (0.054708)***	(-.224041) (.0462901)***	(-.3328329) (.0633635)***	(-.3056987) (.0511872)***	(-.2133439) (.0466762)***	(-.3307391) (.0618897)***	(-.3237607) (.0537017)***
<i>Good</i>	-0.19825 (0.051069)***	-0.2347 (0.065841)***	-0.19276 (0.061834)**	(-.1602654) (.0484254)***	(-.1903671) (.0698864)**	(-.1738727) (.0518681)***	(-.1634458) (.0488817)***	(-.2139472) (.0682072)**	(-.1698433) (.0605912)**
<i>Fair</i>	-0.407248 (0.083702)***	-0.33165 (0.139007)**	-0.09004 (0.182137)	(-.3237983) (.0844395)***	(-.2716265) (.1377697)**	(-.0887231) (.1554044)	(-.3249288) (.09251)***	(-.3110703) (.1473572)**	(-.1295736) (.1245661)
<i>Poor</i>	-0.535883 (0.289188)*	-0.30552 (0.23111)	-0.15172 (0.268656)	(-.4657001) (.30026)	(-.1502037) (.2593707)	(-.0890637) (.2545297)	(-.4362525) (.2980307)	(-.1399154) (.2610054)	(-.1134502) (.2401776)
<i>Province dummy</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES
<i>Time dummy</i>	YES	YES	YES	YES	YES	YES	YES	YES	YES
<i>Race (Africans = Omitted)</i>				YES	YES	YES	YES	YES	YES
<i>Interaction</i>							YES	YES	YES
Constant	-0.062914 (0.340466)	3.829033 (0.400436)***	6.144761 (0.39539)***	(-.3437814) (.3257041)	3.900771 (.4389195)***	6.467245 (.3506521)***	(-.3785314) (.3271946)	3.961859 (.4282755)***	6.473686 (.3517037)***
Observations	18 920	18 920	18 920	18 920	18 920	18 920	18 920	18 920	18 920

Dependent variable= Subjective Well-Being. Statistically significant at 0.01\*\*\*, 0.05\*\* and 0.10\*.

