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DECOMPOSING THE INCREASE IN REPORTED LEVELS OF SUBJECTIVE WELL-BEING IN SOUTH AFRICA FROM 1993 TO 1998

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By

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Improvements in South African Life Satisfaction, 1993 to 1998: Decomposing the Increase

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Abstract: Reported levels of household life satisfaction, also referred to as subjective well-being, increased dramatically in South Africa following the end of Apartheid. This study uses household surveys from 1993-1994 and 1998 in South Africa to investigate why. Models of subjective well-being are estimated following previous literature and a Oaxaca decomposition is then applied, which allows subjective well-being and the determinants of subjective well-being to be examined in a new framework. The decomposition determines what portion of the life satisfaction increase in South Africa is due to improvements in living conditions and what portion is due to changes in the way certain factors 'reward' life satisfaction. The results suggest that fully 92.9 percent of the increase in life satisfaction is due to changes in the reward from the factors considered, not to improvements in living conditions. The results suggest that the determinants of subjective well-being can change substantially over time, and that changes in governmental and social systems can be as or more important than more commonly considered determinants of subjective well-being.

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Chapter 1. Review of Related Literature

The study of the determinants of happiness (also called subjective well-being, well-being, life satisfaction, satisfaction, and welfare) by economists has seen a rapid increase in recent years. Of the total number of journal articles found in a search of EconLit with the terms "happiness," "well-being," or "life satisfaction" in the title, 78 percent were published since 1995 and over 37 percent have been published since 2000 (Clark et al., 2008). Coverage extends to more mainstream media as well (see, for example, *The Economist* (Dec 19, 2006), or *The New York Times* (Leonhardt, 2008)). Consideration of this issue, however, is nothing new. Aristotle and other ancient philosophers discussed the topic at length. Annas (1993, p 28) argues that much of ancient ethics stems from the questioning of one's satisfaction with life as a whole and the path over which it has and will develop.

Past journal articles published on the topic of happiness begin with a discussion of why the issue deserves consideration. Veenhoven (1984) and Ng (1996) provide empirical evidence in support of the idea that happiness is the main objective of most, or even all, people. One result worth mentioning as an example of significant findings from the study of subjective well-being is Clark and Oswald's (1994) discovery that the subjective cost of unemployment is much greater than the associated loss of income. Oswald (1997) and Di Tella et al. (2001) support these results. As another example, Helliwell (2003, p 357) finds that "the effects flowing directly from the quality of [societal] institutions may dwarf those that flow through productivity and economic growth." If correct, these findings suggest that focusing on GDP as the best measure of progress promotes commerce at the expense of happiness. Ferrer-i-Carbonell and Frijters (2004), Helliwell (2003), Kahneman et al. (2004), Kahneman and Krueger (2006), Ng

(1997), Sen (2000), and Veenhoven (2002), among many others, provide in-depth discussions of why the study of subjective well-being can inform policy decisions and, consequently, improve the lives of people around the world.

Beyond the policy implications that come with a greater understanding of subjective well-being, theoretical economic models could be improved through developments in happiness research. Results from studying subjective well-being are, in fact, key to the understanding of some models. Clark et al. (2008, p 137) provide four important examples and the associated economic models which "hinge on key behavioral parameters that could in principle be identified from the empirical analysis of happiness data:"

1. The degree of risk-aversion and the complementarity between own income and reference income, which are important for savings literature;
2. The malleability of reference groups, which is key to migration decisions and education decisions;
3. The kink in utility functions around the reference position, which is important for wage policies and career decisions; and
4. The existence and extent of material and nonmaterial status races, which are paramount for optimal taxation policy.

I believe that the justification for the study of happiness in economics has been sufficiently addressed and will not consider it further here.

What makes people happy? Many past studies on happiness have focused on characteristics such as health, wealth, family, and employment, and their connections with happiness. Others have focused on less obvious conditions and events suspected to play a role in determining an individual's well-being, in addition to inherent human tendencies or personality traits. Expectations about the future and memories of the past are good examples of individual characteristics that might not be obvious determinants of happiness, but that researchers have considered. The passing of time, in a broad sense,

seems to have a relationship with happiness and is considered in most models through the inclusion of age as an independent variable.

Can happiness be measured? While the answer remains uncertain, happiness research in economics that is intended to inform policy decisions has generally focused on "life satisfaction" much more than other measures of pleasure or good feeling. Diener et al. (1999) used experiments to show that pleasant affect, unpleasant affect, and life satisfaction are different phenomena. Because unpleasant and pleasant affect tend to be determined by more immediate circumstances and are therefore more transitory, researchers have tended to focus on measures of overall life satisfaction when studying well-being.

Following is a review of the literature on competing methods of modeling happiness, past happiness studies and the common factors considered, less often considered factors, the economic study of Apartheid in South Africa in brief, and a statistical technique used in this study called a Oaxaca decomposition.

Happiness Models: Top-down versus Bottom-up

Some researchers have proposed a two-layer model of well-being in which an individual's levels of satisfaction in different domains of life determines satisfaction with life as a whole (e.g. Argyle, 1987, and Headey et al., 1985). In other words, satisfaction with one's family life, work, individual health, and other life spheres determines one's overall life satisfaction. The authors of one such study develop this model based on six different domains: health, financial situation, job, leisure, housing, and environment (Van Praag et al., 2003). Satisfaction levels of the individual domains were reported directly by

those surveyed. Though this model does not address what factors influence the levels of satisfaction an individual has with each domain, it provides an understanding of the relative influences each domain has in affecting happiness.

Van Praag et al. (2003)'s findings reveal some interesting relationships. Of the six domains considered, changes in financial situation, health, and job satisfaction, in that order, most strongly correlate with changes in well-being. These are followed, in order, by housing, leisure, and environment. When separating results by the short- and long-term, the researchers find that health is the most important factor in determining short-term happiness, but financial situation becomes most important when considering long-term welfare. They also find that with higher education comes a more critical outlook of one's housing conditions, or, alternatively, that higher education brings higher expectations that are then harder to meet.

Diener (1984) criticizes this "bottom-up" model of well-being suggesting that it could just as easily be the opposite. That is, one's life satisfaction determines one's satisfaction levels of the different life domains. Diener refers to this as a "top-down" model. The top-down model agrees more with the idea that personality traits and other genetic characteristics play large roles in determining an individual's satisfaction with the different aspects of his life.

Attempts to determine which of these model types is better have not settled the debate. Lance et al. (1989) found bottom-up effects for marriage but top-down effects for the domains of job satisfaction and social activities. Heady et al.'s (1991) findings support this. Neither study found significant effects, top-down nor bottom-up, on subjective well being from the health domain.

Why might these competing effects both appear in models of subjective well-being? In 1970 Abraham Maslow proposed the idea of a hierarchy of needs and values now known as "Maslow's Hierarchy of Needs," where lower needs must be met before higher ones become of concern. Saris et al. (1996) consider this and suppose that satisfactions with social relationships might not be of importance unless other satisfactions, such as that with income, are already met.

Common Factors Considered in the Study of Happiness

It is remarkable, though perhaps not surprising, that the causes of happiness considered throughout the course of history have not changed substantially. Aristotle's "constituent parts" of happiness include plenty of friends, good friends, wealth, plenty of children, good children, a happy old age, health, beauty, and fame. A survey by W. Wilson in 1967 finds the typical happy person to be a "healthy, well-educated, well-paid … religious married person" (Wilson, 1967, p 294). Additional similar characteristics in both discussions of happiness include Aristotle's fame, honor, good luck, and excellence and Wilson's extroversion, optimism, and high self-esteem. See Helliwell (2003, p 332-336) for a more complete discussion of the similarities between Aristotle's views and Wilson's survey on happiness.

Most of the recent attention paid to the determinants of subjective well-being has focused on a set of factors similar to those mentioned above. These generally include measures of material well-being, education, health, employment, family, and age. Recently, researchers have considered a more expansive list of factors. Though the results

do not always agree, the common factors are addressed below, followed by discussion of the less often considered factors.

Is ignorance bliss? Fuentes and Rojas (2000) found education to be significant and positively, but only weakly, correlated with happiness. Helliwell (2003) finds similar results. However, the effects of education on happiness are sometimes thought to be indirect. That is, they occur through other channels because higher education is thought to correspond with such things as higher income and better health. In his influential book, *Bowling Alone*, Robert Putnam showed that education is the strongest determinant of participation in many social activities and groups. This participation, in turn, corresponds to higher levels of life satisfaction.

It is easy to imagine that health might play a role in determining life satisfaction. Intuition suggests that poor health and the accompanying pain, restriction of activity, and other hardships would lower subjective well-being. On the other hand, a good constitution, strength, and other athletic abilities would do the opposite. Empirical results confirm this intuition. Fuentes and Rojas (2000) find that good health has significant positive effects on well-being. In fact, of all the factors they consider in explaining variation in life satisfaction, they suggest health is the variable with the greatest explanatory power (p 302). Helliwell (2003) found that an individual's report of being in very good health corresponds to a well-being score 2.46 points higher (on a scale from 1 to 10) than being in a self-assessed state of very poor health. Based on the questions used to collect his data, Helliwell believes the effect he observes reflects a long-term effect. Other research suggests, though, that long-term health status has a much smaller effect on subjective well-being than short-term health (Brickman et al., 1978). Perhaps this is due

to changing expectations and comparison groups that play a greater role in an individual's evaluation of long-term health.

Many studies find positive correlations between marriage and happiness (e.g. Argyle, 1999, and Veenhoven, 1994). Fuentes and Rojas (2000), however, do not find significant effects on well-being from marriage. Helliwell (2003) finds that the effect on welfare due to the difference between being married and separated is slightly greater than that from unemployment. Being separated has a larger negative effect than being divorced, he finds, which lends support to the idea of adaptation effects (discussed below), given that separation generally precedes divorce.

Contrary to what many parents might say, having children does not seem to have a very strong effect on subjective well-being (Cantril, 1965). In fact, Glenn and Weaver (1979) find that in the U.S. the effect of children on happiness appears, though small, to be negative. Others have found that children have a small positive effect on happiness for individuals above certain income levels, but a negative effect at lower levels of income (Plug, 1997).

Results on the connection between age and happiness have not been overwhelmingly consistent. Several studies have found no consistent connection between age and well-being (e.g. Diener and Myers, 1995, and Diener et al., 1999). Others have found that being of relatively high or low age corresponds to higher levels of happiness, whereas the middle-aged report lower levels of life satisfaction (Blanchflower and Oswald, 2004). The World Values Study Group (1994) determined age to have a positive but small effect on happiness. Possible explanations for a general positive relationship between age and happiness, as listed by Ferrer-i-Carbonell and Frijters (2004), are that

the elderly feel they have more control of their lives (Ryff, 1995), or that they have lower expectations and goals (Cambell et al., 1976), or that happy people live longer, resulting in higher percentages of happy people in the later years of life (Argyle, 1999).

Results consistently show a significant decrease in life satisfaction associated with unemployment. Clark and Oswald (1994) and Di Tella et al. (2001) find significant negative effects on subjective well-being from unemployment. It is often difficult to determine from the data the length of unemployment and therefore what adaptation effects may exist. Helliwell (2003) notes that in his study unemployment has a larger negative effect on happiness for individuals in developed countries, suggesting that the adaptation to unemployment of individuals in developing countries, where unemployment is often higher and longer-lasting, lessens the effect of unemployment on subjective well-being.

According to Richard Easterlin, "…in every representative national survey ever done a significant positive bivariate relationship between happiness and income has been found" (2001, p 468). His 1974 article, which describes the "Easterlin paradox," is largely credited with fueling the research interest in the relationship between life satisfaction and income. He attempted to answer the question: Does increasing the income of all increase the happiness of all? The paradox arises from the fact that real income grew substantially in the western world in the second half of the 20th century but without a corresponding rise in reported levels of happiness. Moreover, while income appears to have a relationship with happiness within countries, a similar relationship is not found between countries.

The Easterlin paradox has prompted many attempts to explain the relationship between happiness and material well-being. Richins and Dawson (1992) found that valuing money more than other goals is associated with lower levels of subjective well-being. Kasser and Ryan (1993) similarly observed that individuals who value financial means more than other goals are likelier to have lower levels of happiness, even if they report satisfaction with their financial status. Scitovsky (1976) theorizes that a focus on materialistic goals interferes with the goals that those materials are imagined to achieve.

Clark et al. (2008, p 97), using time-series data in transitional countries, suggest that whatever income's role in determining happiness is, it is larger in developing countries than in developed countries. Diener et al. (1999) support the idea that the wealth of a country affects the happiness-income relationship of the country's citizens. They find that wealthy nations are much happier than poorer nations but that within a wealthy nation wealthy individuals are only somewhat happier than poorer individuals. They conclude that empirical results have not supported any causality between income and well-being, but concede that income generally correlates positively with happiness.

Lane (2000) and others have postulated that income gains affect happiness only up to a certain level above which the influence of income on happiness greatly diminishes. Frey and Stutzer (2002) report a threshold in the US of roughly $10,000 (1995 dollars) above which the happiness gains associated with increased income disappear. Easterlin (1995) found that results supporting the idea of an income threshold are not limited to the United States.

In addition to the idea of an income threshold, a number of recent studies have attempted to explain the Easterlin paradox by considering whether the effect of income

on happiness depends more on the individual's income relative to some comparison group. Easterlin himself believes that increases in welfare from raising the income of all are "offset by the negative effect of higher living level norms brought about by the growth in incomes" (1995, p 36). McBride (2001) finds support for the importance of relative income, both to a comparison group and to an individual's past income, in determining welfare. Additionally, he determines these effects to be stronger at higher levels of income. Ferrer-i-Carbonell (2005) concludes that the influence of a comparison group's income is equally important to an individual's happiness as is the individual's absolute income but in the opposite direction (an increase in the comparison group's income lowers the individual's well-being). Luttmer (2005) supports this, concluding that higher earnings by one's neighbors are associated with lower levels of an individual's self-reported subjective well-being. Knight et al. (2007), using data from poor regions in rural China, find that relative income is twice as important as absolute income in determining an individual's subjective well-being. Ferrer-i-Carbonell (2005) suggests that the comparison is 'upward,' meaning that individuals whose income is lower than the comparison group have lower levels of well-being as a result but that those with incomes higher than the comparison are not happier due to their above-average incomes.

While intuition and the studies discussed above suggest that an increase in comparison group income would correspond to a decrease in well-being, Bookwalter and Dalenberg (2009) find surprising results in South Africa. As one might expect, they find that the "perception" that a household's economic standing is worse than that of the household head's parents has a substantial negative effect on well-being. However, they find that not only does an increase in one's own income correspond to a slight increase in

well-being, so too does an increase in the median income of a geographical comparison group. They conclude that at the very low levels of income and expenditure common in South Africa, "the benefit of living among wealthier people and the public goods it brings outweighs the negatives associated with being the poorest of a peer group" (p 3).

Others suggest that income increases affect subjective well-being proportionally to the income increase. This means that there is not a threshold but that income should be considered in its logarithmic form. Stevenson and Wolfers (2008) have found evidence that contradicts the idea that income gains have little or no bearing on happiness. Furthermore, they suggest that there is no threshold level for the income-happiness relationship. Believing that good data were scarce in the past and thus resulted in an "absence of evidence" for the link between income and happiness, which was "confound[ed]…with evidence of its absence," (p 3) they took another look at the Easterlin paradox. They also criticize earlier studies making comparisons across countries for considering too few nations and nations whose income levels are too similar. Using larger datasets, they found that the relationship between income and happiness is positive, significant, and "robust across countries, within countries, and over time" (p 3). The existence not only of a positive relationship between income and happiness within a country but also across countries, they believe, suggests that there is no income threshold for happiness. They find that the relationship between subjective well-being and GDP is actually three times stronger in wealthier countries than poorer countries. Wolfers (2003) also observed that reported levels of happiness tend to move in the same direction as the business cycle. Re-analyzing the data originally used by Easterlin, Stevenson and Wolfers (2008) show that while happiness in Europe and Japan has increased over time

with rising GDP, the U.S. has not seen increases in happiness and remains a curious outlier. However, their theories still do not address the fact that individuals who experience a sudden increase in income, such as from winning the lottery, do not demonstrate lasting increases in levels of happiness (Argyle, 1999).

Though the relationship between income and happiness is far from clear and results frequently suggest different conclusions, the debate has brought about important revelations about the nature of happiness. Most significant is the recognition that welfare depends on far more than material well-being. And while the factors discussed above (material well-being, marriage and children, employment, education, age, and health) tend to be the most often included measures in models of well-being, past research has covered a variety of other factors.

Other Determinants of Happiness

The importance of personality, an individual's social environment, the quality of governance, goals and aspirations, religion, and adaptation have all been considered as determinants of happiness. Following is a discussion of some of these factors.

Results have generally found a positive correlation between religiosity and life satisfaction. Able to distinguish between the importance of God in someone's life and the frequency with which they attend church, Helliwell (2003) finds that both have a positive influence on well-being but that the effect due to a belief in God is three times stronger than that from attending church. While finding a similar positive correlation between religiosity and well-being, others have determined that religious behavior, such as church attendance, has a larger correlation than a "religious attitude" (Gartner et al., 1991).

Diener et al. (1999, p 287) provide a brief summary of some of the literature connecting religiosity and well-being:

> A number of large studies, often based on national samples, show that SWB correlates significantly (although the effect sizes are not large) with religious certainty (Ellison, 1991), strength of one's relationship with the divine (Pollner, 1989), prayer experiences (Poloma and Pendleton, 1991), and devotional and participatory aspects of religiosity (Ellison, Gay, and Glass, 1989).

That religiosity corresponds to higher levels of life satisfaction is relatively clear but why this is the case remains less so. Practicing religion has intellectual, social, moral, and existential components, among many others, that have proven particularly difficult to tease apart (Diener et al., 1999; Pollner, 1989; Ellison, 1991).

Many studies of happiness have focused on the idea of habituation or adaptation. Often referred to as the hedonic treadmill, this is the idea that people adapt to events in their life such that while these events may at first have an effect on their happiness, over time they return to "hedonic neutrality" (Brickman and Campbell, 1971). Happiness, this theory proposes, is affected not just by current conditions but also by one's expectations of the future and experienced levels of happiness in the past.

If we are each simply running on our own personal hedonic treadmill, designing policies to improve happiness would seem particularly fruitless. However, recent empirical work by Diener et al. (2006) suggests that the hedonic treadmill theory needs some significant revisions. Their first finding is not surprising: individuals have different set points of happiness which are determined in part by personality traits and temperaments. However, they find that these set points are not, in fact, hedonically neutral. Furthermore, they suggest that individuals may have multiple happiness set points, each relating to a different component of well-being (such as pleasant emotions,

unpleasant emotions, and life satisfaction) and that these components can move in opposing directions. Most strikingly, they observe that individuals' set points *can* change in response to external events, and individuals differ in the way that their set points change. Furthermore, an experiment by Kahneman and Snell (1992, p 197) led them to conclude that "subjects do not show impressive ability to predict changes in their tastes."

Differences in societal tendencies and qualities of governance have also been considered as determinants of life satisfaction. Helliwell (2003) considers different qualities of governance through measures of stability and lack of violence, voice and accountability, government effectiveness, the regulatory framework, the rule of law, and corruption. He finds that national levels of interpersonal trust have a significant positive effect on subjective well-being and that there are "substantial well-being benefits from improvements in the quality of governance" (p 347). These results make intuitive sense given that the quality of governance likely relates to the quality of services individuals receive from their government, which in turn play a role in determining well-being. National levels of membership in community groups, Helliwell observes, are a significant factor in determining individual well-being. He finds that an increase by one in the average number of community groups that citizens participate in corresponds to a greater increase in an individual's happiness than that individual would get from being married.

While many authors maintain their usefulness in understanding some aspects of what makes people happy, models of subjective well-being often have low explanatory power. Diener (1984), however, found that the inclusion of personality types or traits greatly improves a model's explanatory power. He argues that while demographic and socioeconomic factors often can only explain 15 percent of the variation in happiness, an

individual's genes and personality traits can explain as much as 80 percent. Diener and Lucas (1999) also found that personality traits are the best predictors of happiness. Some people, they suggest, are naturally programmed to be happier. But personality traits, even if they are large determinants of life satisfaction, certainly make a poor target for public policy.

South Africa and Apartheid

Apartheid, the institutionalized segregation and discrimination of black South Africans by the ruling white minority, became official policy in 1948. Discrimination took many forms including the forced relocation of black South Africans to ten "homelands" within South Africa. The state excluded blacks from participation in the national government, which had authority over the tribal governments of the homelands. This system intentionally combated poverty amongst whites at the expense of blacks and other racial groups by providing whites with a more extensive welfare system, better education, and the reservation of jobs. The release of imprisoned black leaders and the legalization of previously banned black congresses initiated the dismantling of Apartheid in the early 1990s. In 1994, Nelson Mandela was elected president in the first all-race elections in South Africa's history.

The vast majority of black South Africans live under the conditions of the developing world, while the white minority has means similar to those in developed countries. In 1993, using Klasen (1997)'s expenditure-based measures of poverty, 64 percent of black South Africans lived in poverty, while poverty rates among South African whites were barely above zero. Of the total South African population, 24 percent

lived below the US$1 per day (1985 dollars) threshold for poverty. When compared to similar middle-income countries, South Africa ranks second to last in infant mortality and last in life expectancy, literacy, fertility, and access to safe water. If only blacks are considered, South Africa ranks as low as much poorer African nations. In countries with similar income levels as South Africa, those with the lowest rates of poverty are also those with the least inequality. Needless to say, South Africa's inequality ranks among the world's worst and it is difficult not to blame the intentional inequalities of Apartheid which "ensur[ed] that the majority of the population was not sharing in the considerable wealth of the country" (Klasen, 1997, p 60).

Klasen (1997) gives further evidence of the extreme inequality and poverty in South Africa in 1993. Over 40 percent of South African consumption went to the wealthiest 10 percent while the poorest 40 percent of households consumed less than 10 percent of the total. The poverty rate in rural areas (73 percent) was over three times as high as that in urban areas. Households headed by those with no education had poverty rates pushing 80 percent while only 7 percent of those headed by someone with at least a secondary education were impoverished. Households headed by those with no education would have needed an average income increase of 80 percent to reach the poverty threshold. The poor were much likelier to report low levels of overall life satisfaction and the urban poor reported even lower levels than the rural poor. As further evidence of racial inequality, race, in 1993, was a better predictor of expenditure levels than either household size or education.

In addition to expenditure-based measures of poverty, Klasen (2000) develops a deprivation index based on Amartya Sen's conception of poverty. Sen (1992) proposes an

understanding of poverty as the abilities an individual has available to attain certain states such as being healthy, well-fed, clothed, and sheltered. This approach considers outcomes of well-being rather than just measures of the means (e.g. income) used to attain these outcomes. Sen considers it foolish to disregard the actual attainment of the desirable outcomes. Klasen's (2000) deprivation index includes 14 measures intended to capture different levels of education, wealth, housing, sanitation and access to clean water, health and nutrition, safety, and perceived well-being.

Using this deprivation index, Klasen finds that expenditure-based measures of poverty miss large portions (around 30 percent) of the population living under conditions that do not meet minimal subsistence levels. The expenditure-based poverty measure does a particularly poor job of capturing deprivation for those whose expenditure is in the lowest forty percent. Rates of deprivation exceed poverty rates for households that are smaller, black, rural, less educated, and headed by females. Disregarding the other factors, South Africa's history of Apartheid and the associated inequality of public good provision leaves no room for surprise at blacks' presence in this list. Further, urban dwellers, even the expenditure-poor, are less deprived than rural residents, and deprivation is more heavily concentrated (than expenditure poverty) in the ten former black homelands. Lastly, 92 percent of those who are not impoverished based on expenditure but are identified as deprived by Klasen's index come from rural areas and 99 percent of them are black. In short, expenditure-based measures of poverty miss a large portion of severely deprived black South Africans.

Despite an increase in social spending by the South African government following the end of Apartheid, significant racial inequality persists. Moller and Saris

(2001) create models of well-being for five groups (whites, Asians, coloured, urban blacks, and rural blacks) of South Africans. Using data from 1995 they find that levels of employment, education, housing, and infrastructure are inferior for all black South Africans, and even more so for rural blacks. On both subjective and objective measures of income, employment, education, housing, and subjective measures of "life in general," a common racial pattern emerges: rural blacks have the lowest levels, followed closely by urban blacks and coloureds, with a gap before higher levels for Asians and whites.

Moller and Saris find that the models are most similar at the socioeconomic extremes with blacks (rural and urban) at one end and whites at the other. They attribute this to future expectations, which play similar roles for these racial groups but in opposite directions. Cantril (1965) provides evidence that people generally evaluate their prospective happiness to be greater than their present, which they in turn report to be higher than their past levels of happiness. Unsurprisingly, the end of Apartheid has resulted in blacks reporting low levels of satisfaction when asked about their past and much higher levels expected in the future. The opposite is true for whites. Moller and Saris suggest that these results are driven by future expectations that differ significantly from memories of the past.

That whites in South Africa the year after the end of severe discrimination of blacks generally feel that they were more satisfied in the past and their future outlook is dim would seem to reflect poorly on them. Dickow and Moller (2000) show that white South Africans who were accepting of integration were more optimistic than those who were less accepting. But while one observes the majority of improvement in life satisfaction from 1993 to 1998 in black South Africans, the average level of happiness

increased for whites, coloureds, and Indians/Asians as well. It seems, then, that the end of Apartheid was good for everyone in South Africa, though the reasons remain unclear.

The Oaxaca Decomposition

In this study I use a simple statistical technique known as a Oaxaca decomposition to shed light on the nature of the increase in life satisfaction in South Africa from 1993 to 1998. Ronald Oaxaca first used the technique in 1973. Oaxaca was attempting to determine the portion of the wage difference for urban males and females due to discrimination (Oaxaca, 1973). Since its introduction, the Oaxaca decomposition has been most commonly used in labor economics. It aids in understanding labor market differences faced by workers of different genders, races, and sexual orientations. The use of a Oaxaca decomposition on models of well-being, grouped temporally, is the most significant contribution this study makes to the literature. A complete explanation of the Oaxaca decomposition, summarized below, can be found in *Labor Market Discrimination* (Borjas, 2008)**.**

Suppose we are attempting to isolate the fraction of the wage difference between males and females that is due to discrimination. We first estimate separate but parallel (using the same variables) equations for males and females. For the sake of example, assume that the only variable that determines a worker's wage is education. The wage equations can be written:

$$W_m = \alpha_m + \beta_m E_m \text{ and } W_f = \alpha_f + \beta_f E_f . \qquad (1)$$

where W is the wage, m and f denote female and male, E is a measure of the level of education, and α is a constant. The average wage difference can then be written:

$$\Delta\overline{W} = \overline{W}_m - \overline{W}_f = \alpha_m - \alpha_f + \beta_m\overline{E}_m - \beta_f\overline{E}_f, \qquad (2)$$

where a bar denotes the mean. If we add and subtract the term $\beta_m\overline{E}_f$ on the right side of equation (2) we can then separate the equation into two useful terms. Adding and subtracting $\beta_m\overline{E}_f$ from equation (2) gives us:

$$\Delta\overline{W} = [(\alpha_m - \alpha_f) + (\beta_m - \beta_f)\overline{E}_f] + [\beta_m(\overline{E}_m - \overline{E}_f)]. \qquad (3)$$

If employers reward education equally for males and females then we would have $\beta_m - \beta_f = 0$. Similarly, if employers value males and females with no education equally we should see $\alpha_m - \alpha_f = 0$. Recognizing this, we see that the first term in square brackets in equation (3) can be interpreted as the portion of the wage difference due to discrimination while the second term in square brackets is the portion of the wage difference due to a difference in the average levels of education for males and females.

When using a Oaxaca decomposition with models of subjective well-being, the interpretation becomes slightly less clear. The technique still decomposes the difference in well-being between two groups into two portions. Like in the wage example, the first term in equation (3) represents the fraction of the difference in the average levels of the dependent variable due to the differences in the way that the independent variables 'reward' the dependent variable of each group. Alternatively, this may be easier understood as the fraction of the difference in the average levels of well-being due to differences in the estimated coefficients. The second term represents the difference in the dependent variable of each group due to differences in the means of the independent variables.

To apply the previous Oaxaca decomposition to a well-being scenario, suppose that life satisfaction is determined only by income. Then the model for life satisfaction in a given year can be written

$$S_t = \alpha_t + \beta_t I_t \qquad (4)$$

where *S* is the level of life satisfaction, *I* is a measure of income, *t* denotes the year and α is a constant. As in the wage example, the average difference in life satisfaction between two years can then be written

$$\Delta\bar{S} = \bar{S}_{t1} - \bar{S}_{t2} = \alpha_{t1} - \alpha_{t2} + \beta_{t1}\bar{I}_{t1} - \beta_{t2}\bar{I}_{t2}. \qquad (5)$$

We add and subtract the term $\beta_{t1}\bar{I}_{t1}$ from the right side of (2) and get

$$\Delta\bar{S} = [(\alpha_{t1} - \alpha_{t2}) + (\beta_{t1} - \beta_{t2})\bar{I}_{t2}] + [\beta_{t1}(\bar{I}_{t1} - \bar{I}_{t2})]. \qquad (6)$$

If income influences life satisfaction the same in 1998 as it does in 1993, then we would have $\beta_{t1} - \beta_{t2} = 0$. Similarly, if happiness levels for people with no income are the same in both years we should see $\alpha_{t1} - \alpha_{t2} = 0$. Then, like the wage example, we see that the first term in square brackets in equation (6) is the portion of the life satisfaction difference due to differences in the way that income influences happiness in each year. The second term in square brackets is the portion of the happiness difference due to a difference in the average levels of income in 1993 and 1998.

For this study I use different years rather than different genders to determine the two groups. From 1993 to 1998 there were substantial changes in the reported levels of life satisfaction in South Africa. Using a Oaxaca decomposition on parallel models of life satisfaction for these years reveals the fraction of the change in well-being that is due to changes in the way that the independent variables in the model 'reward' well-being. It

also reveals the fraction of the change in well-being that is due to changes in the average levels of housing, income, and the other independent variables. In other words, are South Africans happier in 1998 than 1993 because they are more educated, have higher incomes, and better living conditions? Or, are people happier not because their conditions have improved, but because they get greater returns to their life satisfaction in 1998 from the same levels of education, income, housing, etc.? And if it is the latter, what does that mean? These questions are discussed in the next chapter.

Chapter 2. Empirical Analysis

Does the way that a country governs itself matter most, or do better ends justify more questionable means? In other words, if a brutal dictator were to lead his nation towards a higher GDP (gross domestic product), would this be better than a government that emphasized fairness at the expense of economic growth? Emphasizing fairness does not necessarily impede growth, but in the situation investigated in this paper a distinct change in a nation's system of government towards an unquestionably fairer system was accompanied by poor performance according to traditional economic standards. GDP might be the most common indicator used to measure progress, but it is unclear if it is the best way to determine what is 'better.' What if we could find out how changes in a governmental system affect people in a very broad way, such as how they report their life satisfaction overall? Is overall life satisfaction likelier to be more affected by the process through which one's government rules them, or would one sacrifice a fair system in order to have measurably better living conditions? This paper attempts to answer these questions in the context of Apartheid in South Africa.

The end of Apartheid in South Africa provides an opportunity to examine the questions posed above. The economic and living conditions of most South Africans did not improve in the five years following Nelson Mandela's election in 1994. The end of the extreme discrimination of black South Africans, who are by far the largest racial group in South Africa, might be expected to bring about significant changes in the lives of everyone involved. It is difficult, though, to see improvements by looking at most economic measures. Traditional economic theory suggests that giving a large portion of any population more freedoms, rather than preventing the majority of them from participating in productive sectors of the economy, would help the economy through

greater labor force participation and mobility. Moral opposition to Apartheid might also have discouraged some from living in South Africa, further limiting South Africa's labor force.

Given that most measures of living conditions show that South Africans were, on average, no better off in 1998 than they were in 1993, it is startling to see that many more report higher satisfaction with their life in 1998 (Figure 1). There are clear differences when these results are examined by race and, not surprisingly, black South Africans show the largest increases in reported life satisfaction (Figure 2).

The percentage of South Africans reporting neutral or better life satisfaction nearly doubled from 1993 to 1998. Only 32.6 percent of black South Africans reported neutral or better life satisfaction in 1993 but fully 76.6 percent reported so in 1998. The percentages improved for all of the other racial groups as well with coloureds, Indians/Asians, and whites seeing increases of 30.3, 16.6, and 8.1 percentage points, respectively.

Figure 1. Distribution of Reported Life Satisfaction in South Africa (1 low, 5 high)

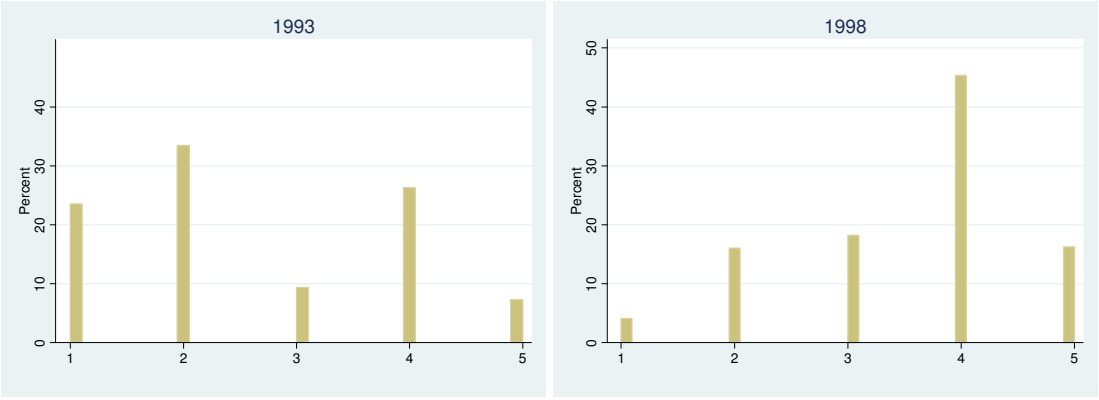
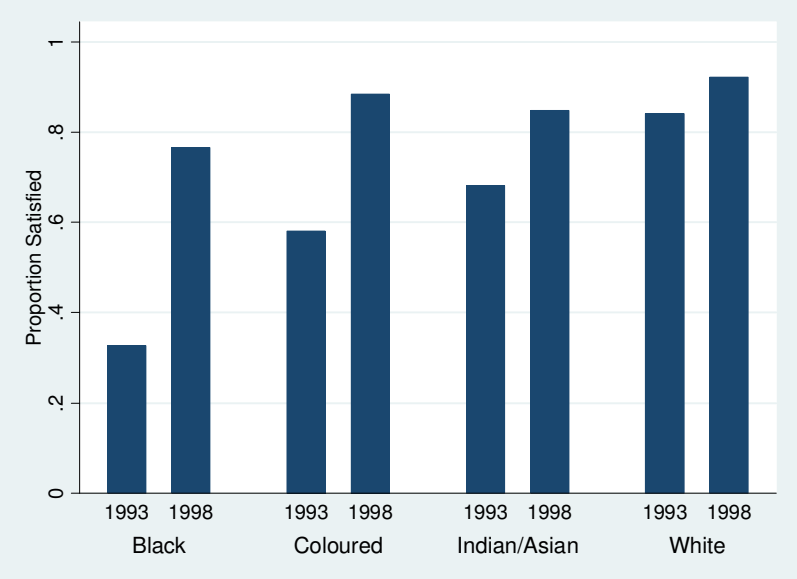


Figure 2. Percentage of South Africans reporting neutral or better life satisfaction, by race and year



But what portion of this change is due to improvements in living conditions, and what portion is due to something else? Moreover, what might that something else be? The most obvious answer is the end of Apartheid. Has the end of Apartheid brought improvements in the education, employment, health, and other living conditions of South Africans? If having piped water into one's house, rather than having to haul it from a nearby well, increases the probability of being "very satisfied" with one's life by a certain amount in 1993, should we expect to find the same relationship in 1998? Maybe the end of Apartheid did not actually change much in the day-to-day lives of black South Africans and the optimism that they felt in 1993, anticipating the end of Apartheid, faded into a great sense of despair. Could this be overcome by improvements in living conditions? Perhaps black South Africans in 1998, no longer living in such an oppressive environment, have become more concerned with their housing conditions and educations and these things now play a different role in determining happiness. Has the end of segregation and discrimination delivered new freedoms to most South Africans such that

worsening employment conditions were overcome by less tangible changes, causing people to be happier?

This paper attempts to take advantage of the interesting and relatively unique situation rising from the presence of subjective well-being data with economic and demographic data from both before and after this remarkable change in South Africa's government and social systems. By estimating parallel models of well-being for 1993 and 1998 and analyzing the differences, I attempt to determine why reported levels of life satisfaction have improved dramatically in the years following the end of Apartheid. The empirical strategy used to answer these questions is discussed below. Following this are sections describing the data, the empirical results, and concluding remarks.

Empirical Strategy

First, models of life satisfaction for 1993 and 1998 are estimated based on past modeling of subjective well-being as discussed in Chapter 1. The independent variables include measures of income, housing, health, education, employment, and race. Additionally, variables denoting urban/rural living environment, whether any household members have been the victim of a recent crime, household size, marital status, and number of children are included. Based on past explorations of the best ways to model well-being, it would be surprising if the explanatory power of these models is particularly high. The exclusion of personality traits and other individual characteristics especially limits the explanatory power of the models estimated in this paper. However, the primary focus of this paper is to understand how the determinants of well-being have changed

over time with the end of Apartheid. Accordingly, the exclusion of time-invariant determinants of happiness such as personality type is not overly problematic.

The equations are estimated using a standard ordinary least squares regression resulting in a linear model of life satisfaction rated on a five-point scale. As such, the estimated coefficients can be interpreted as the change on the five-point scale of the dependent variable resulting from a one-unit change in the respective independent variable. The model can be written:

$$LifeSatisfaction_i = \alpha + \beta * House_i + \gamma * HouseholdCharacteristics_i + \delta * Income_i + \omega * Employment_i + \phi * Health_i + \varphi * Race_i + \lambda * Crime_i + \varepsilon_i, \quad (1)$$

where ε_i is a random error term, and *i* represents the i^{th} household in the study.

Following the estimation of these models, a Oaxaca decomposition is applied with the observations from the two time periods treated as different groups. A Oaxaca decomposition separates the mean difference in the dependent variable between two groups into two portions. One is the portion of the difference due to group differences in the endowments (also called levels, or characteristics) of the independent variables. The second is the portion of the difference due to differences in the estimated coefficients (also called rewards).

For this paper, the causes of the changes in reported life satisfaction from 1993 to 1998 are decomposed into the portion due to changes in living conditions, incomes, levels of education, and other measurable characteristics (the endowments effect), and the portion due to changes in the way that household's subjective well-being is determined by given levels of endowments (the coefficients effect). Separate decompositions by race are considered as well as an overall decomposition including all races. Following is a brief description of how the Oaxaca Decomposition works.

Suppose that life satisfaction is determined only by income and the relationship is linear. Then the model for life satisfaction in a given year can be written

$$S_t = \alpha_t + \beta_t I_t + \varepsilon_t \qquad (2)$$

where *S* is the level of life satisfaction, *I* is a measure of income, ε is the error, α and β are parameters, and *t* denotes the year. The average difference in life satisfaction between two years can be written

$$\Delta\bar{S} = \bar{S}_1 - \bar{S}_2 = \alpha_1 - \alpha_2 + \beta_1\bar{I}_1 - \beta_2\bar{I}_2 . \qquad (3)$$

By adding and subtracting the term $\beta_1\bar{I}_2$ from the right side of (3), the equation can be written

$$\Delta\bar{S} = [(\alpha_1 - \alpha_2) + (\beta_1 - \beta_2)\bar{I}_2] + [\beta_1(\bar{I}_1 - \bar{I}_2)] . \qquad (4)$$

If income influences life satisfaction the same in 1998 as it does in 1993, then we should have $\beta_1 - \beta_2 = 0$. Similarly, if happiness levels for people with no income are the same in each year we should see $\alpha_1 - \alpha_2 = 0$. Thus, the first term in square brackets in equation (4) can be interpreted as the portion of the life satisfaction difference due to differences in the way that income influences happiness in each year (the coefficients effect), while the second term in square brackets is the portion of the happiness difference due to a difference in the average levels of income in 1993 and 1998 (the endowments effect).

The results of the Oaxaca decomposition should help answer the questions posed at the beginning of this chapter. If results are more important than the process by which a country is governed, we should find that the majority of the increase in life satisfaction is due to changes in endowments. Alternatively, if the way that the independent variables

reward household satisfaction changes, suggesting that the fairness of the system matters more, we should find the reverse.

Previous studies of life satisfaction often compare linear models to ordinal models. The intuition is that moving from a '1' to a '2' on a five-point scale of life satisfaction may not be a comparable change to that of moving from, say, a '4' to a '5.' The linear model assumes an even spacing of the response categories whereas the ordered model does not. Accordingly, this paper considers an ordered logit model.

The ordered logit model appeals to the idea of a latent dependent variable. In a life satisfaction context, this is the idea that life satisfaction is truly an unobserved, continuous measure, say Y^*. Y^* is unobserved in the surveys, which collect only a measure of Y, the level of well-being reported using the five responses available on the scale. The relationship between Y and Y^* can be understood as follows:

$$
\begin{aligned}
Y = \quad & 1 \text{ if } Y^* < \Omega_1 \\
& 2 \text{ if } \Omega_1 \le Y^* < \Omega_2 \\
& 3 \text{ if } \Omega_2 \le Y^* < \Omega_3 \\
& 4 \text{ if } \Omega_3 \le Y^* < \Omega_4 \\
& 5 \text{ if } \Omega_4 \le Y^*
\end{aligned}
$$

where the Ωs represent the cut-off values used by respondents to determine how to fit their level of happiness into the life satisfaction scale. The cut-off values are estimated along with the coefficients. With the coefficient and cut-off estimates, the model can be used to estimate the likelihood of a response in each of the five life-satisfaction categories. The category with the highest estimated probability is interpreted as the model's prediction.

Estimation of an ordered logit model results in different equations for each outcome category. The estimated coefficients are assumed to be the same for each

equation, but the curves are shifted horizontally based on the estimated cut-off values. Ordered logit estimation is done using maximum likelihood rather than least squares. The equations for the ordered logit model can be written:

$$P(y=1|x) = \frac{e^{\Omega_1 - x\beta}}{1+e^{\Omega_1 - x\beta}}$$

$$P(y=m|x) = \frac{e^{\Omega_m - x\beta}}{1+e^{\Omega_m - x\beta}} - \frac{e^{\Omega_{m-1} - x\beta}}{1+e^{\Omega_{m-1} - x\beta}}$$

$$P(y=J|x) = 1 - \frac{e^{\Omega_{J-1} - x\beta}}{1+e^{\Omega_{J-1} - x\beta}}$$

for m=1 to J outcome categories with the $x\beta s$ assumed to be the same in each equation.

Because there are different equations for each outcome category, estimation of an ordered logit model results in a different set of marginal effects for each outcome category. That is, a change in a given independent variable affects the probability of a "very dissatisfied" response differently than it affects the probability of a "dissatisfied" (or any other) response. Thus, the set of five marginal effects (one for each outcome category) for each independent variable will be compared with the single estimated coefficient for each independent variable from the linear model. The Oaxaca decomposition for the ordered model is done following Bauer and Sinning (2008) and Sinning et al. (2008).

Whether an ordered model is truly better at modeling subjective well-being than a linear model has been debated. Ferrer-i-Carbonell and Frijters (2004) examine the effects of modeling methodology on estimates of the determinants of life satisfaction and find that the estimates from a linear model differ surprisingly little from a fixed-effect ordered logit model. Additionally, they conclude that assuming cardinality of satisfaction responses "makes little difference to the results" (p 642). Helliwell (2003) finds that the cut-off points in his ordered model are spaced approximately equally which he believes

suggests that the change from one level of happiness to the next is the same across the entire scale. He concludes that "the results do not depend importantly on whether the measures of subjective well-being are treated as ordinal or cardinal" (p 354). Ng (1997) makes a compelling case for treating subjective responses not only as cardinal but also as interpersonally comparable. While acknowledging that cardinally measuring well-being may be difficult, Ng explains that this does not mean subjective well-being is not a cardinally measurable quantity. It seems reasonable that the respondent's own ideas as to the ordinality or cardinality of such scales would influence his answer. This study considers both models without claiming preference for one over the other.

The Data

The data for this paper include two separate cross-sections from household surveys conducted in South Africa in 1993-1994 and 1998. Though this dataset has some shortcomings compared to panel datasets, it is much more useful than a single cross-section. The use of two similar cross-sectional surveys allows for a more complete understanding of happiness, its determinants, and how these things have changed over time. Many variables in the two surveys considered are directly comparable, and adjustments (described below) have been made to ensure an appropriate comparison between the two surveys.

The 1993-1994 survey (hereafter: SALDRU) was conducted by the South Africa Labour Development Research Unit at the University of Capetown and supported by the World Bank's Project for Statistics on Living Standards and Development (South Africa

Labour Development Research Unit, 1994). Data collection took place in late 1993 and early 1994. Approximately 9,000 households were surveyed.

The 1998 data (hereafter: OHS) are from Statistics South Africa's October Household Survey, conducted each year from 1995 to 1999 (Statistics South Africa, 1998). The data from 1998 were chosen because they provide the largest temporal gap from 1993 for which the majority of variables, especially those involving subjective well-being, are comparable to the SALDRU data. Over 100,000 individuals, making up nearly 20,000 households, were surveyed. In both years the survey was conducted in person at the site of the household's dwelling.

Fortunately, most of the questions important to this paper were worded similarly in each survey. The only frequent problem regarding the comparability of the data between surveys came from changes in the categorization of the answers. In these cases the categories have been condensed so that responses from both surveys could be categorized in the same way.

Measures of monthly expenditure, as originally captured in the data, are largely incomparable. The measure of expenditure included in the SALDRU data was computed after the fact from survey answers to questions regarding general consumption behavior. Researchers then imputed an estimated monthly expenditure. Expenditure measures for the OHS data were determined simply by asking respondents how much money they spent in the previous month, accounting for any unusual large purchases. Though economic theory suggests that consumption is a more appropriate measure of material well-being than income (Clark et al., 2008), these data do not allow its use. Accordingly, reported measures of monthly income are used. In some of the OHS cases, income was

reported by income bracket rather than the actual income amount. In these cases the midpoint value of the bracket is used as an estimate. This occurred in slightly less than ten percent of the OHS data. For the top bracket, which has a floor but no ceiling, a value greater than the floor of the bracket by an amount equal to the size of the previous bracket has been used. This is an arbitrary, though reasonable, choice that affects less than 0.03 percent of the OHS data.

The original categorization in the SALDRU survey for an individual's highest level of education was done by the highest standard (grade level) completed by that individual. This ranged from 0 (no education) to 10 (standard 10). Standard 10 corresponds to grade 12, or the senior year of high school, in the United States. For purposes of discussion, I refer to education levels in terms of US high school equivalents. However, some of the categories were used not just to represent the highest standard completed but also to represent completion of various certificates. For example, an education level coded in the data as '08' means that the individual either completed standard 8 or received their Junior Certificate. Furthermore, the data codes continued in the same fashion to represent "post high school" training such as a diploma from a technical institution (coded '14'), training as a teacher ('12') or nurse ('13'), or completion of a university degree ('16').

The categorization of an individual's highest level of education in the OHS survey was done similarly to the SALDRU survey for lower levels of education. But no categories were used to represent completion of a certificate in addition to a standard (such as '08' in the SALDRU survey). Furthermore, training past standard 10 is represented only by a dummy variable indicating whether or not the individual received

an additional certificate (rather than which type of certificate). While completion of some university courses is captured by the SALDRU categorization, the OHS categorization only includes whether or not the individual completed a bachelors degree at a university.

To allow for the comparison of levels of education, the education categories have been condensed as follows: no education (no schooling at any level), low education (some schooling up to but not including the first year of high school), some high school, completed high school, and completed a bachelor's degree.

The categorization of responses regarding sources of cooking energy and water, and housing and sanitation types, had problems similar to the education categories. Similar adjustments have been made to allow for comparison. The original categories, along with the condensed categories used for this paper and the complete list of variable names, labels, and definitions, can be found in Appendix A.

Some observations have been dropped as outliers or because of missing data. A number of housing and several income outliers have been removed. The housing outliers all involved questionably high numbers (some upwards of thirty) of rooms in a single dwelling. Furthermore, these cases often had housing reported as a hut or shack. The income outliers included instances where the reported incomes were the highest in the data set yet the housing conditions were poor. Observations with missing values in one or more of the independent variables were dropped from the sample. The full sample and the subset resulting from the exclusion of observations with missing data have similar means across all variables.

Life satisfaction in both surveys was reported at the household level. The head of the household was asked, "Taking everything into account, how satisfied is this

household with the way it lives these days?" Responses were coded on a scale with five categories: very satisfied, satisfied, neutral, dissatisfied, and very dissatisfied. While some concerns exist about how accurately the head can speak for the entire household, Bookwalter, Fuller, and Dalenberg (2006) find that this representation is reasonable.

Because the information on the dependent variable was collected at the household level, the data at the individual level have been collapsed to the household level. In most cases this was done simply by averaging the data over the entire household. The income measure used is the average household income per household member. Income is measured in one-thousand rand with 2008 as the base year. Household levels of education are captured through a measure of the highest level of education achieved by the most educated household member, the number of household members who have completed high school, and the number of children in the household not currently attending school. Unemployment is measured as both the percentage and the number of household members over 16 years old that were unemployed in the week preceding the survey. An estimate of illness and injury captures the total number of household members ill or injured in the two weeks leading up to the survey. Table 1 presents descriptive statistics.

Table 1. Descriptive Statistics

	1993 mean	1993 sd	1998 mean	1998 sd	Percent change
Life Satisfaction	2.60	1.29	3.54	1.07	36%
HH Characteristics					
Number of people in HH	5.17	3.39	4.39	2.67	-15%
Number of HH adults	3.02	1.82	2.56	1.42	-15%
Average HH age	29.39	12.26	30.22	14.00	3%
Live alone?	0.13	0.34	0.13	0.34	-3%
Number of HH males	2.50	1.83	2.05	1.50	-18%
HoH male?	0.72	0.45	0.62	0.49	-14%

HoH married?	0.58	0.49	0.42	0.49	-29%
Urban environment?	0.54	0.50	0.56	0.50	3%
Education (base: none)					
None	0.04	0.19	0.04	0.19	7%
Low (up to high school)	0.39	0.49	0.36	0.48	-7%
Some high school	0.45	0.50	0.49	0.50	10%
Completed high school	0.10	0.30	0.07	0.26	-27%
Completed bachelor's degree	0.03	0.18	0.04	0.19	20%
Number of high school grads	0.18	0.54	0.15	0.46	-18%
Number of children not in school	0.09	0.37	0.21	0.52	133%
Housing (base: shack)					
Shack	0.10	0.30	0.10	0.30	0%
House	0.59	0.49	0.69	0.46	16%
Poor quality	0.31	0.46	0.16	0.37	-47%
Other	0.00	0.04	0.05	0.22	3058%
HH owns dwelling?	0.67	0.47	0.75	0.43	12%
Rooms per person	1.16	1.11	1.25	1.08	8%
Cooking energy (base: gathered fuel)					
Gathered	0.29	0.45	0.22	0.42	-23%
Burn (coal/charcoal/paraffin)	0.26	0.44	0.23	0.42	-13%
Electricity	0.42	0.49	0.52	0.50	25%
Gas	0.03	0.17	0.03	0.16	-13%
Other	0.00	0.03	0.00	0.04	14%
Sanitation (base: bucket or no toilet)					
Bucket or none	0.18	0.38	0.17	0.37	-6%
Flush toilet	0.48	0.50	0.51	0.50	5%
Latrine	0.34	0.47	0.33	0.47	-4%
Water access (base: haul)					
Haul	0.42	0.49	0.33	0.47	-21%
Easy access outside	0.22	0.41	0.29	0.45	35%
Water piped into dwelling	0.36	0.48	0.38	0.48	4%
Income and employment					
Avg monthly income (1000 rand)	1.24	3.68	1.06	2.93	-15%
Log avg monthly income	0.003	1.00	-0.10	0.97	-2972%
Number of unemployed HH	1.84	1.66	1.86	1.54	1%
Average hours worked (week)	18.14	17.89	17.42	19.15	-4%
Illness, injury, and crime					
Number ill or injured (2 weeks)	0.39	0.69	0.18	0.36	-54%
HH member murdered this year?	0.01	0.08	0.01	0.11	69%
HH member robbed this year?	0.06	0.24	0.08	0.27	30%
Race (base: White)					
White	0.14	0.35	0.12	0.32	-16%
Black					
	0.75	0.43	0.75	0.43	0%

Coloured	0.08	0.27	0.11	0.31	35%
Indian/Asian	0.03	0.17	0.02	0.15	-24%
n	7650		17823		

HH stands for Household; HoH for Head of Household.

Though the 1998 conditions are clearly not identical to the conditions in 1993, there is little obvious improvement. Most measures have changed by less than 20 percent and related measures often show changes in opposing directions. For example, more households have a member with a bachelor's degree yet the numbers of children not attending school has increased. Similarly, average household age has gone up but households have fewer adults. However, changes in income and unemployment are consistent with each other and are both worse in 1998. Some of the large percentage changes are due to changes in variables that had relatively small levels to begin with (e.g. Housing – other). Blacks remain the largest racial group. There is a larger percentage of coloureds and smaller percentages of Indians/Asians and whites. On average, more households have a member with a bachelor's degree, but households also have greater numbers of children that are not attending school. While illness and injury have decreased, crime has increased. More households live in houses and the average number of people in a household has decreased. Accordingly, the average number of rooms per person in household dwellings has increased. Reported life satisfaction is nearly one full point higher (on the five point scale) in 1998 than 1993.

Empirical Results

Four different linear model specifications are considered in this paper and the results are quite similar. Linear estimation results with robust standard errors are

presented in Tables 2 and 3. Following a discussion of these results, the results from the ordered logit models are presented in Tables 4 and 5.

The linear models including income in both its raw and logarithmic form yielded fairly consistent coefficient estimates on the other independent variables. However, income proved only to be statistically significant when included in logarithmic form. Including unemployment as the number of unemployed adults in each household, rather than as the percentage of unemployed household adults, had only minor effects on the model. For ease of discussion, I will focus on model specification (4) which includes income in logarithmic form and unemployment as the number of unemployed adults.

Table 2. Linear Regression Results - 1993

Model specification differences are: (1) income, unemployment as percentage of household; (2) log income, unemployment as percentage of household; (3) income, number of unemployed adults in HH; (4) log income, number of unemployed adults in HH.

	(1)	(2)	(3)	(4)
Number of people in HH	0.007	0.003	0.009	0.005
	(0.01)	(0.01)	(0.01)	(0.01)
Number of HH adults	-0.024	-0.025	0.012	0.015
	(0.01)	(0.01)	(0.02)	(0.02)
Average HH age	0.005**	0.005**	0.004**	0.004**
	(0.00)	(0.00)	(0.00)	(0.00)
Live alone?	0.142*	0.153*	0.182**	0.196**
	(0.06)	(0.06)	(0.06)	(0.06)
Number of HH males	0.009	0.011	0.010	0.012
	(0.01)	(0.01)	(0.01)	(0.01)
HoH male?	0.028	0.039	0.034	0.045
	(0.05)	(0.05)	(0.05)	(0.05)
HoH married?	0.060	0.051	0.059	0.051
	(0.05)	(0.05)	(0.05)	(0.05)
Urban environment?	-0.171***	-0.164***	-0.175***	-0.169***
	(0.05)	(0.05)	(0.05)	(0.05)
Education - low	-0.038	-0.036	-0.023	-0.019
	(0.08)	(0.08)	(0.08)	(0.08)
Education – some high school	0.055	0.066	0.070	0.081
	(0.09)	(0.09)	(0.09)	(0.09)
Education – completed high school	0.101	0.128	0.127	0.156
	(0.11)	(0.11)	(0.11)	(0.11)
Education – completed bachelor's	0.470***	0.499***	0.501***	0.533***

	(0.14)	(0.14)	(0.14)	(0.14)
Number of high school grads	0.052	0.054	0.044	0.045
	(0.05)	(0.05)	(0.05)	(0.05)
Number of children not in school	-0.010	-0.012	-0.017	-0.020
	(0.04)	(0.04)	(0.04)	(0.04)
Housing - house	0.201***	0.206***	0.199***	0.203***
	(0.05)	(0.05)	(0.05)	(0.05)
Housing - poor	0.446***	0.458***	0.450***	0.461***
	(0.06)	(0.06)	(0.06)	(0.06)
Housing - other	0.508	0.514	0.506	0.512
	(0.36)	(0.36)	(0.36)	(0.36)
HH owns dwelling?	0.120***	0.134***	0.116***	0.128***
	(0.03)	(0.03)	(0.03)	(0.03)
Rooms per person	-0.007	-0.003	-0.008	-0.005
	(0.02)	(0.02)	(0.02)	(0.02)
Cooking energy - burn	0.161***	0.162***	0.160***	0.161***
	(0.04)	(0.04)	(0.04)	(0.04)
Cooking energy - electricity	0.339***	0.347***	0.341***	0.349***
	(0.06)	(0.06)	(0.06)	(0.06)
Cooking energy - gas	0.385***	0.388***	0.385***	0.388***
	(0.09)	(0.09)	(0.09)	(0.09)
Cooking energy - other	0.455	0.431	0.434	0.410
	(0.41)	(0.39)	(0.41)	(0.39)
Sanitation - flush toilet	-0.016	0.001	-0.012	0.004
	(0.07)	(0.07)	(0.07)	(0.07)
Sanitation - latrine	0.165***	0.165***	0.164***	0.163***
	(0.04)	(0.04)	(0.04)	(0.04)
Water - easy access outside	0.109*	0.095	0.110*	0.097
	(0.05)	(0.05)	(0.05)	(0.05)
Water - piped into dwelling	0.142	0.129	0.147*	0.136
	(0.07)	(0.07)	(0.07)	(0.07)
Average monthly income (1000 rand)	-0.002		-0.001	
	(0.00)		(0.00)	
Log average monthly income		-0.058***		-0.052**
		(0.02)		(0.02)
Number of unemployed adults			-0.058***	-0.063***
			(0.02)	(0.02)
Percentage of unemployed adults	-0.246***	-0.279***		
	(0.06)	(0.06)		
Average hours worked (week)	0.003*	0.003*	0.005***	0.005***
	(0.00)	(0.00)	(0.00)	(0.00)
Number ill or injured (last 2 weeks)	-0.053**	-0.051*	-0.053**	-0.052**
	(0.02)	(0.02)	(0.02)	(0.02)
HH member murdered this year?	0.042	0.046	0.045	0.049
	(0.18)	(0.18)	(0.18)	(0.18)

HH member robbed this year?	-0.176**	-0.171**	-0.177**	-0.172**
	(0.06)	(0.06)	(0.06)	(0.06)
Black	-1.152***	-1.181***	-1.144***	-1.172***
	(0.06)	(0.06)	(0.06)	(0.06)
Coloured	-0.585***	-0.612***	-0.586***	-0.613***
	(0.07)	(0.07)	(0.07)	(0.07)
Indian/Asian	-0.283**	-0.300***	-0.287***	-0.306***
	(0.09)	(0.09)	(0.09)	(0.09)
constant	2.820***	2.852***	2.640***	2.649***
	(0.15)	(0.15)	(0.14)	(0.14)
n	7650	7650	7650	7650
F	70.05	70.40	69.44	69.75
p	0.000	0.000	0.000	0.000
BP^ statistic	209.91	206.70	212.99	210.47
BP^ p-value	0.000	0.000	0.000	0.000
Adjusted R-squared	0.207	0.208	0.206	0.207

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors are in parenthesis.
^ Breusch-Pagan test for heteroskedasticity on the models before using robust standard errors

Table 3. Linear Regression Results - 1998

Model specification differences are: (1) income, unemployment as percentage of household; (2) log income, unemployment as percentage of household; (3) income, number of unemployed adults in HH; (4) log income, number of unemployed adults in HH.

	(1)	(2)	(3)	(4)
Number of people in HH	0.007	0.011	0.014	0.018*
	(0.01)	(0.01)	(0.01)	(0.01)
Number of HH adults	-0.053***	-0.053***	-0.009	-0.007
	(0.01)	(0.01)	(0.01)	(0.01)
Average HH age	0.004***	0.005***	0.004***	0.005***
	(0.00)	(0.00)	(0.00)	(0.00)
Live alone?	-0.110***	-0.117***	-0.086**	-0.092**
	(0.03)	(0.03)	(0.03)	(0.03)
Number of HH males	-0.005	-0.006	-0.005	-0.006
	(0.01)	(0.01)	(0.01)	(0.01)
HoH male?	-0.005	-0.007	-0.005	-0.007
	(0.02)	(0.02)	(0.02)	(0.02)
HoH married?	-0.014	-0.013	-0.016	-0.015
	(0.02)	(0.02)	(0.02)	(0.02)
Urban environment?	-0.111***	-0.110***	-0.114***	-0.113***
	(0.03)	(0.03)	(0.03)	(0.03)
Education - low	0.045	0.042	0.047	0.045
	(0.04)	(0.04)	(0.04)	(0.04)
Education – some high school	0.123**	0.115**	0.129**	0.121**
	(0.04)	(0.04)	(0.04)	(0.04)
Education – completed high school	0.163*	0.152*	0.180*	0.168*
	(0.07)	(0.07)	(0.07)	(0.07)
Education – completed bachelor's	0.205*	0.192*	0.223**	0.211*

	(0.09)	(0.09)	(0.09)	(0.09)
Number of high school grads	0.043	0.036	0.034	0.027
	(0.04)	(0.04)	(0.04)	(0.04)
Number of children not in school	-0.022	-0.022	-0.028	-0.029
	(0.02)	(0.02)	(0.02)	(0.02)
Housing - house	0.245***	0.242***	0.244***	0.241***
	(0.03)	(0.03)	(0.03)	(0.03)
Housing - poor	0.150***	0.146***	0.151***	0.147***
	(0.04)	(0.04)	(0.04)	(0.04)
Housing - other	0.284***	0.267***	0.298***	0.280***
	(0.05)	(0.05)	(0.05)	(0.05)
HH owns dwelling?	0.080***	0.071***	0.075***	0.066**
	(0.02)	(0.02)	(0.02)	(0.02)
Rooms per person	0.032**	0.031**	0.030**	0.030**
	(0.01)	(0.01)	(0.01)	(0.01)
Cooking energy - burn	-0.048	-0.047	-0.051	-0.049
	(0.03)	(0.03)	(0.03)	(0.03)
Cooking energy - electricity	0.218***	0.215***	0.218***	0.214***
	(0.03)	(0.03)	(0.03)	(0.03)
Cooking energy - gas	0.124*	0.122*	0.122*	0.120*
	(0.06)	(0.06)	(0.06)	(0.06)
Cooking energy - other	0.715***	0.711***	0.718***	0.713***
	(0.20)	(0.20)	(0.19)	(0.19)
Sanitation - flush toilet	-0.066	-0.075*	-0.060	-0.070*
	(0.04)	(0.04)	(0.04)	(0.04)
Sanitation - latrine	0.037	0.034	0.040	0.037
	(0.03)	(0.03)	(0.03)	(0.03)
Water - easy access outside	0.150***	0.155***	0.150***	0.156***
	(0.02)	(0.02)	(0.02)	(0.02)
Water - piped into dwelling	0.176***	0.177***	0.174***	0.174***
	(0.04)	(0.04)	(0.04)	(0.04)
Average monthly income (1000 rand)	0.002		0.003	
	(0.00)		(0.00)	
Log average monthly income		0.034***		0.037***
		(0.01)		(0.01)
Number of unemployed adults			-0.070***	-0.072***
			(0.01)	(0.01)
Percentage of unemployed adults	-0.221***	-0.216***		
	(0.05)	(0.05)		
Average hours worked (week)	-0.001	-0.001	-0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)
Number ill or injured (last 2 weeks)	-0.112***	-0.112***	-0.111***	-0.111***
	(0.02)	(0.02)	(0.02)	(0.02)
HH member murdered this year?	-0.142	-0.140	-0.145	-0.144
	(0.08)	(0.08)	(0.08)	(0.08)

HH member robbed this year?	-0.323***	-0.324***	-0.322***	-0.324***
	(0.03)	(0.03)	(0.03)	(0.03)
Black	-0.137***	-0.128***	-0.128***	-0.118***
	(0.03)	(0.03)	(0.03)	(0.03)
Coloured	0.037	0.048	0.038	0.048
	(0.03)	(0.03)	(0.03)	(0.03)
Indian/Asian	0.000	0.002	-0.006	-0.005
	(0.05)	(0.05)	(0.05)	(0.05)
constant	3.306***	3.302***	3.124***	3.125***
	(0.09)	(0.09)	(0.07)	(0.07)
n	17823	17823	17823	17823
F	47.46	47.93	47.66	48.25
P	0.000	0.000	0.000	0.000
BP^ statistic	456.88	458.10	456.78	458.63
BP^ p-value	0.000	0.000	0.000	0.000
Adjusted R-squared	0.082	0.082	0.082	0.083

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors are in parenthesis.
^ Breusch-Pagan test for heteroskedasticity on the models before using robust standard errors

From 1993 to 1998 the effect of income on well-being, though tiny in both years, switches from negative to positive. It is statistically significant in both cases. A one percent increase in income implies a 0.00052 point decrease in the expected life satisfaction response on a scale of 1 to 5 in 1993. In 1998, the same one percent increase in income implies a 0.00037 point increase in life satisfaction. Compared to the effects from the other determinants of happiness discussed below, these are negligible. It is interesting though that income's effect on happiness changes from negative during Apartheid to positive after Apartheid's end. Perhaps wealthier minorities experienced worse discrimination under Apartheid because they were seen by white South Africans as a larger threat to the status quo. Why this would necessarily change with the end of Apartheid, however, is not clear. Maybe the end of Apartheid expanded the number of ways for most South Africans to use their income, which could explain the increased reward that income brings in terms of happiness. Given the overwhelmingly small effects

that income has on happiness in both years, it is difficult to draw many strong conclusions except that income plays very little role in determining happiness in South Africa during the mid-1990s.

The number of unemployed adults in a household has the expected (and statistically significant) negative correlation with happiness. This relationship is stronger in 1998 than in 1993, though it is more consistent over time than most other relationships examined in this study.

In both years, the direction and magnitudes of the estimated coefficients on the education variables suggest that higher levels of education correspond with higher levels of subjective well-being. However, in 1993 only the estimated coefficient corresponding to completion of a bachelor's degree is statistically significant. In 1998, in addition to the completion of a bachelor's degree, the completion of all or even just some high school has a statistically significant positive relationship with happiness. Also worth noting is that while completion of a bachelor's degree in 1993 corresponds to a life satisfaction 0.53 points higher on the five point scale, all else equal, this drops to only 0.21 points higher in 1998. Taken all together, it appears not only that education plays a stronger role in determining happiness in 1998 than in 1993 but that in 1998 the effects are more evenly distributed across the educational spectrum. While having a household member with a bachelor's degree has a strong positive correlation with happiness and is the only statistically significant educational measure in 1993, lower levels of education in 1998 become statistically significant and are comparable to the completion of a bachelor's degree.

The number of children not in school and the number of household members who have completed high school are signed as expected (negative for children not in school, positive for household members that completed high school). The magnitude of the estimated coefficient on the number of children not in school is greater in 1998 than in 1993, though the magnitude of the estimated coefficient on the number of high school graduates in each household is smaller. This is somewhat contradictory, but the overall effect of the differences in the coefficient estimates should be revealed with the Oaxaca decomposition.

Given the historical context and the timeframe that the data represent it is not surprising that race is the most revealing independent variable included in these models. The change from 1993 to 1998 of the effect of being black on happiness, relative to being white, is clear. In 1993, being black corresponds to a reported life satisfaction 1.17 points lower on the five-point scale than being white. In 1998 this drops to 0.12 points lower than whites. Being coloured or Indian/Asian in 1993, relative to being white, also has negative correlations with happiness. Relative to being white, all else constant, being coloured in 1993 corresponds to a reported life satisfaction of 0.61 points lower. Being Indian/Asian corresponds to 0.31 points less. These negative effects disappear almost completely in 1998. While the relationships between racial groups and happiness described above should not be surprising in the context of Apartheid, the magnitude of the changes from 1993 to 1998 is remarkable. The negative effect felt from being a non-black minority living under Apartheid is sizable yet it disappears almost completely after the end of Apartheid. And while there is still a negative relationship between life satisfaction and being black, it is substantially smaller in 1998 than in 1993.

Overall, the variable groups used to capture the living environment and the day-to-day living conditions show a correspondence between better living conditions and higher levels of happiness. There are some interesting changes, though, from 1993 to 1998. Intuition would seem to predict that living in a nicer dwelling would correspond to higher levels of well-being. Living in a house, relative to living in poor quality housing or even a shack, ought to be a more pleasant existence and representative of a more comfortable lifestyle. (Poor quality housing refers to housing of poorer quality than a house, though better than a shack.) Indeed, the regression results consistently show this, with only one oddity: in 1993, living in a house corresponds to a higher level of life satisfaction than living in a shack, but not as high as living in poor quality housing. This changes in 1998 when the effect of living in poor quality housing drops by more than half while the effect of living in a house remains relatively constant. Ownership of the dwelling also has a positive and statistically significant relationship with happiness though it appears to matter less than the type of housing. Living in an urban environment has a negative effect on well-being in both years. The relationships between life satisfaction and both dwelling ownership and living in an urban environment decrease from 1993 to 1998.

There is a variety of housing types and distilling them into a relatively small number of categories loses a large amount of information. Moller and Saris (2001) find that rural blacks report higher satisfaction with their housing, despite a higher percentage of them living in traditional mud huts, as opposed to the shacks more often lived in by urban blacks. Given this, and the inclusion of an unfortunately large 'other' housing category, it is difficult to make conclusions regarding housing. However, the overall

relationship between housing and happiness represented in these models is generally in line with the idea that housing quality relates positively with life satisfaction.

The relationships revealed by the model between happiness and better access to water and better sources of energy for cooking agree with the notion that improved living conditions influence life satisfaction in a positive way. There is a statistically significant positive relationship in both 1993 and 1998 between happiness and having electricity or gas for cooking, relative to burning gathered wood or dung. If burning fuel such as wood, paraffin, dung, or coal is the main source of energy for cooking, the estimated coefficients reveal that in 1993 it is better if the fuel does not have to be gathered. In 1998, however, there is little difference between burning gathered or purchased wood, dung, coal, or paraffin. Additionally, the positive relationship between cooking with electricity and gas is smaller. Taken as a group, the cooking energy source variables show the expected relationship with happiness, though this relationship is weaker in 1998 than in 1993.

In 1998 having easy access to water outside (rather than hauling it from a distance) corresponds to an increase in life satisfaction roughly equivalent to that from two unemployed household adults finding employment. Having water piped directly into the dwelling corresponds to an even larger improvement in life satisfaction. The magnitudes of the estimated coefficients in 1993 suggest a similar relationship, though they are not statistically significant.

Perhaps surprisingly, there appears to very little effect on household life satisfaction from the makeup of the household. Not the size of the household, the number of household adults, the average household age, the gender of the household head, nor

even the marital status of the household head matter much. The estimated coefficients for most of these variables are not statistically significant and even where statistically significant they are quite small.

While the household makeup matters little, the illness or injury of a household member in the two weeks preceding the survey corresponds to a decrease in the household's subjective well-being. A statistically significant negative relationship also exists from having a household member that is the victim of a robbery. In both cases the strength of this relationship more than doubles from 1993 to 1998. In other words, the negative effects on well-being from an illness, injury, or robbery are more than twice as strong in 1998 as they are in 1993.

Overall, it appears that the linear estimation results in this study are in line with those from past attempts at modeling subjective well-being. But what is to be made of the weakening of the relationship over time between happiness and race, when the relationships between happiness and many of the other independent variables appear to strengthen? The Oaxaca decompositions discussed below provide an understanding of the overall changes in the relationship between happiness and the independent variables. Before discussion of this, however, consideration is given to an ordered logit model of life satisfaction.

As discussed previously, it may be reasonable to think that the difference between two levels on a happiness scale, say '1' to '2' and '4' to 5' on a five-point scale, are not the same. Using a linear model assumes that the scale is evenly spaced, but an ordered model relaxes that assumption. The estimated marginal effects from an ordered logit model of life satisfaction, using the same independent variables as the linear models

discussed above, are presented in Tables 4 and 5. Marginal effects were calculated using Stata's mfx2 command (Williams, 2007). Estimated coefficients from the ordered logit models, and the associated measures of fit, can be found in Appendix C. As seen in the table, there is a different set of marginal effects for each happiness category on the scale. The estimate in each column represents the percentage point change in the likelihood of that response from a one unit change in the associated independent variable. Independent variables that have a positive relationship with life satisfaction should generally show increasing values from the lower categories (on the left of Tables 4 and 5) to the higher categories (on the right). The opposite is true for independent variables that have a negative relationship with happiness.

Table 4. Marginal Effects for Ordered Logit Model -1993

	very	dissatisfied	neutral	satisfied	very
Number of people in HH	-0.001	-0.000	0.000	0.001	0.000
Number of HH adults	-0.004	-0.002	0.001	0.004	0.001
Average HH age	-0.001*	-0.001*	0.000*	0.001*	0.000*
Live alone?	-0.052***	-0.035**	0.008***	0.061***	0.019**
Number of HH males	-0.004	-0.002	0.001	0.004	0.001
HoH male?	-0.008	-0.004	0.001	0.009	0.002
HoH married?	-0.016	-0.008	0.003	0.017	0.005
Urban environment?	0.037**	0.020**	-0.007**	-0.039**	-0.011**
Education - low	0.002	0.001	-0.000	-0.002	-0.000
Education – some high school	-0.023	-0.013	0.004	0.024	0.007
Education – completed high school	-0.038	-0.025	0.006	0.044	0.013
Education – completed BA	-0.108***	-0.109***	0.006	0.151***	0.061**
Number of high school grads	-0.011	-0.006	0.002	0.012	0.003
Number of children not in school	0.006	0.003	-0.001	-0.006	-0.002
Housing - house	-0.061***	-0.030***	0.011***	0.063***	0.017***
Housing - poor	-0.115***	-0.080***	0.016***	0.135***	0.043***
Housing - other	-0.100	-0.101	0.006	0.139	0.056
HH owns dwelling?	-0.039***	-0.019***	0.007***	0.040***	0.011***
Rooms per person	0.000	0.000	-0.000	-0.000	-0.000
Cooking energy - burn	-0.034***	-0.021**	0.006***	0.038***	0.011**
Cooking energy - electricity	-0.073***	-0.042***	0.013***	0.080***	0.023***

Cooking energy - gas	-0.076***	-0.064***	0.008***	0.098***	0.034**
Cooking energy - other	-0.071	-0.060	0.008***	0.092	0.032
Sanitation - flush toilet	0.006	0.003	-0.001	-0.006	-0.002
Sanitation - latrine	-0.036***	-0.021***	0.006***	0.040***	0.011***
Water - easy access outside	-0.019	-0.011	0.003	0.021	0.006
Water - piped into dwelling	-0.032	-0.018	0.006	0.035	0.010
Log average monthly income	0.015***	0.008***	-0.003***	-0.016***	-0.005***
Number of unemployed adults	0.016***	0.008***	-0.003***	-0.016***	-0.005***
Average hours worked (week)	-0.001***	-0.001***	0.000***	0.001***	0.000***
Number ill or injured (last 2 weeks)	0.013*	0.007*	-0.002*	-0.014*	-0.004*
HH member murdered this year?	-0.008	-0.004	0.001	0.009	0.002
HH member robbed this year?	0.048**	0.019***	-0.010**	-0.046**	-0.012***
Black	0.224***	0.205***	-0.005	-0.284***	-0.141***
Coloured	0.190***	0.022***	-0.039***	-0.141***	-0.032***
Indian/Asian	0.088***	0.025***	-0.018**	-0.076***	-0.019***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5. Marginal Effects for Ordered Logit Model -1998

	very	dissatisfied	neutral	satisfied	very
Number of people in HH	-0.001*	-0.003*	-0.002*	0.003*	0.004*
Number of HH adults	0.000	0.002	0.001	-0.001	-0.002
Average HH age	-0.000***	-0.001***	-0.001***	0.001***	0.001***
Live alone?	0.006*	0.019*	0.012**	-0.018*	-0.019**
Number of HH males	0.000	0.001	0.001	-0.001	-0.001
HoH male?	0.000	0.001	0.001	-0.001	-0.001
HoH married?	0.001	0.004	0.003	-0.004	-0.004
Urban environment?	0.006***	0.022***	0.016***	-0.020***	-0.024***
Education – low	-0.003	-0.011	-0.008	0.010	0.012
Education – some high school	-0.008**	-0.028**	-0.019**	0.025**	0.029**
Education – completed high school	-0.010**	-0.034*	-0.027*	0.028**	0.043*
Education – completed BA	-0.011**	-0.042**	-0.034*	0.031***	0.055*
Number of high school grads	-0.003	-0.010	-0.007	0.009	0.010
Number of children not in school	0.002	0.006	0.004	-0.005	-0.006
Housing – house	-0.015***	-0.050***	-0.032***	0.048***	0.049***
Housing – poor	-0.008***	-0.027***	-0.020***	0.023***	0.031***
Housing – other	-0.014***	-0.052***	-0.043***	0.036***	0.073***
HH owns dwelling?	-0.004*	-0.012*	-0.008**	0.011*	0.012**
Rooms per person	-0.002**	-0.006**	-0.004**	0.006**	0.007**
Cooking energy - burn	0.004*	0.012*	0.008*	-0.011	-0.012*
Cooking energy - electricity	-0.013***	-0.045***	-0.030***	0.041***	0.047***
Cooking energy - gas	-0.007*	-0.025*	-0.019*	0.021**	0.030*
Cooking energy - other	-0.027***	-0.110***	-0.118***	-0.025	0.280*
Sanitation – flush toilet	0.005*	0.017*	0.012*	-0.016*	-0.019*

Sanitation - latrine	-0.001	-0.005	-0.003	0.004	0.005
Water - easy access outside	-0.009***	-0.032***	-0.023***	0.028***	0.036***
Water - piped into dwelling	-0.011***	-0.037***	-0.026***	0.032***	0.041***
Log average monthly income	-0.002***	-0.008***	-0.006***	0.008***	0.009***
Number of unemployed adults	0.004***	0.015***	0.010***	-0.014***	-0.016***
Average hours worked (week)	0.000	0.000	0.000	-0.000	-0.000
Number ill or injured (last 2 weeks)	0.006***	0.020***	0.014***	-0.019***	-0.021***
HH member murdered this year?	0.010	0.031	0.019	-0.031	-0.028
HH member robbed this year?	0.025***	0.076***	0.039***	-0.079***	-0.061***
Black	0.007***	0.024***	0.017***	-0.021***	-0.027***
Coloured	-0.002	-0.008	-0.006	0.007	0.009
Indian/Asian	-0.001	-0.003	-0.002	0.002	0.003

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

The relationships revealed by the ordered logit model are strikingly similar to those found in the linear model. With only one exception, the relationships between life satisfaction and each independent variable in both of the ordered models have the same sign as the estimates from the linear models. (The relationship between happiness and having a flush toilet in 1993 is the only exception. The ordered models suggest a negative relationship while the linear model finds a positive relationship. However, in both models the relationship is tiny and not statistically significant.)

The ordered logit model assumes that the estimated coefficients are the same in the equations for each outcome category. This is known as the parallel regression assumption, or the proportional odds assumption, and means that the estimated curves for each outcome category differ only in how they are horizontally shifted by the estimated cut-off values. A Wald test (Brant, 1990) suggests that the models based on the dataset in this paper violate this assumption. However, a generalized ordered logit model, which does not rely on this assumption, yields estimates quite similar to those from the ordered models. The generalized ordered logit model has predictions identical to the ordered logit model in nearly 72 percent of the cases in 1998 and 81 percent of the cases in 1993. A

table comparing the marginal effects for the generalized ordered logit model and the ordered logit model can be found in Appendix D. Given these similarities and the use of the Oaxaca decomposition, which does not apply to the generalized ordered logit model, the ordered logit model is considered despite violation of the parallel regressions assumption.

In 1993, the independent variables with the strongest relationships to happiness in the ordered model are similar to those in the linear model. Race is by far the best predictor of happiness. Being black, relative to white, in 1993 corresponds to a 22.7 percentage point increase in the likelihood of the lowest response on the happiness scale and a 15.6 percentage point decrease in the likelihood of a "very satisfied" response. The relationships for coloureds and Indians/Asians, as in the linear model, are similar though slightly smaller. Education and housing in the 1993 ordered model play the same roles in predicting happiness as they do in the 1993 linear model. The general correlation between higher education and higher happiness exists, while completion of a bachelor's degree clearly stands out as the best educational predictor. For the housing variables, the ordered model has the same curiosity as the linear model. That is, both living in a house or living in poor quality housing, relative to living in a shack, have a positive relationship to happiness but the estimated increase in happiness due to living in poor quality housing is larger than that from living in a house. Though income has a statistically significant negative relationship with happiness, as in the linear model, it is still quite small.

The best predictors in the 1998 ordered model remain race, education, and housing. The effects from race and housing condition, again, are weaker in 1998 than 1993. As in the linear models, lower levels of education emerge as stronger predictors of

happiness in 1998. Completion of a bachelor's degree, though still a good predictor, no longer stands out as the only important educational measure. In both years the household makeup matters little in determining the household's overall life satisfaction.

Predicted values from both sets of models can be seen in Tables 6 - 9. The ordered model is the best predictor for 1993 but the worst for 1998. However, the percentage of correct predictions is reasonably consistent across all four models, falling within a range of 17.4 percentage points. As discussed previously, the predictive powers of the models are not overwhelmingly strong but this is consistent with past modeling of life satisfaction with data that do not include information on personality type.

Table 6. Linear Predictions -1993

Life satisfaction from 1 (low) to 5 (high)

	Predicted values					
Reported values	1	2	3	4	5	Total
1	5	1,321	433	42	0	1,801
2	5	1,778	681	97	0	2,561
3	0	329	295	91	0	715
4	1	657	816	540	1	2,015
5	1	125	200	232	0	558
Total	12	4,210	2,425	1,002	1	7,650
Percentage correct		**34.2%**				

Table 7. Linear Predictions -1998

Life satisfaction from 1 (low) to 5 (high)

	Predicted values					
Reported values	1	2	3	4	5	Total
1	0	1	505	223	0	729
2	0	7	1,867	982	0	2,856
3	0	2	1,774	1,471	0	3,247
4	0	1	3,123	4,962	1	8,087
5	0	1	953	1,950	0	2,904
Total	0	12	8,222	9,588	1	17,823
Percentage correct		**37.8%**				

Table 8. Ordered Logit Predictions -1993

Life satisfaction from 1 (low) to 5 (high)

	Predicted values					
Reported values	1	2	3	4	5	Total
1	326	1,313	0	162	0	1,801
2	336	1,919	0	306	0	2,561
3	46	446	0	222	1	715
4	96	949	0	957	13	2,015
5	23	190	0	335	10	558
Total	827	4,817	0	1,982	24	7,650
Percentage correct		**42.0%**				

Table 9. Ordered Logit Predictions -1998

Life satisfaction from 1 (low) to 5 (high)

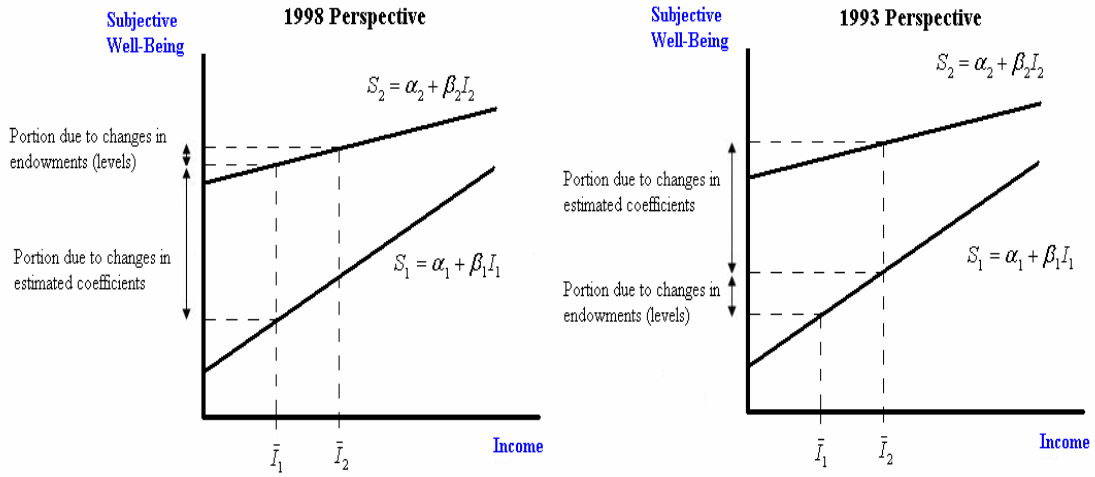
	Predicted values					
Reported values	1	2	3	4	5	Total
1	174	460	0	95	0	729
2	483	2,004	0	369	0	2,856
3	384	2,265	0	592	6	3,247
4	580	4,975	0	2,515	17	8,087
5	181	1,739	0	973	11	2,904
Total	1,802	11,443	0	4,544	34	17,823
Percentage correct		**26.4%**				

Two ways of modeling subjective well-being in South Africa have thus far been considered and models from before and after the end of Apartheid have been compared. The models tell a similar story, one that suggests a changing relationship over time between happiness and economic and other living conditions. The data show that South Africans, on average, report much higher levels of life satisfaction after the end of Apartheid. Following is a discussion of the causes of the increase in happiness as revealed by the Oaxaca decompositions.

The results of the Oaxaca decomposition for the ordered logit model are presented in Table 10. The table includes two sets of results, one from the perspective of 1998 and

the other from 1993. That is, one set of results is calculated using the estimated coefficients from 1998 and the second uses the 1993 estimated coefficients. The results are somewhat different. A graphical depiction of how this is possible can be seen in Figure 3. In this example, it is assumed that subjective well-being is determined only by income and the relationship is linear (this second assumption is simply for ease of discussion and depiction since the ordered logit model is non-linear). In both years, assume income has a positive effect on well-being but that this effect is stronger in Year 1 (1993 in this study) than it is in Year 2 (1998). Given the steeper slope in Year 1, using Year 1's perspective results in the attribution of a larger portion of the total change in subjective well-being to the change in endowments. This is depicted in the right-hand panel of Figure 3.

Figure 3. Graphical Depiction of the Difference in Reference Year Choice for the Oaxaca Decomposition



Though it is often difficult to determine which perspective is appropriate to use when the Oaxaca decomposition is applied to compare genders or races, it is easier in this situation. Arguments for using one race as the reference tend to be based on whether one group is being discriminated against or the other is being advantaged in some way. In the

case of Apartheid in South Africa, it is clear that those in 1993 are experiencing severe discrimination not only relative to South Africans in 1998 but relative to the discrimination faced by most people in most of the world.

Table 10. Ordered Logit Oaxaca Decomposition

Results	Coef.	Percentage
Differential	1.012	
1998 Perspective		
Endowments	0.086	8.5%
Coefficients	0.926	91.5%
1993 Perspective		
Endowments	0.439	43.4%
Coefficients	0.573	56.6%

From either perspective, the Oaxaca decompositions reveal that the majority of the change in average levels of happiness from 1993 to 1998 is due to changes in the estimated coefficients. From the perspective of 1993, 43.4 percent of the happiness improvement is due to improvements in the levels of the independent variables and 56.6 percent is due to changes in the way that given levels of these factors influence a household's well-being. Switching to 1998's perspective, only 8.5 percent of the improvement comes from changes in the levels while fully 91.5 percent is due to changes in the estimated coefficients.

Another way to think about this is to consider how happy South Africans in 1993 might expect to be if they knew how their living conditions, incomes, educations, and other factors would change over the coming five years. If they imagined that nothing would change in the way things make them happy but knew what their 1998 levels would be, then they would expect to be 0.41 points happier on average in 1998 (43.4 percent of

the total happiness change of 0.94 points is 0.41 points). But in 1998, now knowing that their happiness is determined differently than it was in 1993, they would recognize that not only are they happier from improvements in the levels of their characteristics, but also that they are even happier than these improvements would have led them to believe back in 1993. Knowing their new "happiness formula," they would recognize that their expectation of a 0.41 point happiness increase was wrong. They now know that their new levels of education, income, housing, etc. increased their happiness by only 8.5 percent, but that they are an additional 0.53 points happier due to changes in what makes them happy.

The results from the linear Oaxaca decomposition can be seen in Table 11. They are consistent across all model specifications. Unlike the results of the non-linear decomposition, changing from one reference year to the other has little qualitative effect in the linear decomposition. For simplicity, only the results of the model specification focused on previously, using 1998 as the reference year, are presented. The decomposition results using 1993 as the reference year can be found in Appendix B.

Table 11. Linear Oaxaca Decomposition Results (1998 as reference year)

Portion of Happiness improvement due to changes in:		
	Coefficients	Endowments
All Races	92.9%	7.1%
Black	91.6%	8.4%
Coloured	90.6%	9.4%
Indian/Asian	125.5%	-25.5%
White	75.3%	24.7%

The results of the linear Oaxaca decomposition show that only 7.1 percent of the increase in average levels of happiness from 1993 to 1998 is due to changes in the levels

of the independent variables. This suggests that South Africans are happier in 1998 not because their incomes went up, or because they have higher educations, better houses, improved access to water, etc., but because having the same levels of the independent variables brings a greater reward, in terms of happiness, in 1998. Earlier discussion of the models showed that the relationships between a number of the independent variables and happiness changed from 1993 to 1998. This decomposition reveals that these changing relationships drove 92.9 percent of the increase in happiness.

Given that three-fourths of the South African population is black there may be concern that the overall results are largely driven by the black population. As seen in Table 11, the results from linear Oaxaca decompositions run separately by race are similar to the overall results. A larger portion of the happiness increase for whites is explained by improvements in living conditions, rather than the estimated coefficients, but it is still less than 25 percent. For Indians/Asians, changes in the levels of the independent variables actually suggest a fall in reported levels of well-being. However, this was overcome by stronger gains in the returns to happiness seen from given levels of the independent variables.

Concluding Remarks

The results of this paper are consistent across model types and races and the story they tell is clear. South Africans are happier in 1998 than they were in 1993 and this improvement in happiness is mostly due to changes in the way that the factors considered influence happiness. This result is true not just for black South Africans, who experienced the most discrimination under Apartheid, but for all South Africans. It is true

that a portion of the happiness improvement is due to changes in the characteristics of the population, but nearly every estimate of this portion is less than 25 percent. The end of Apartheid is the most obvious change in South Africa from 1993 to 1998 that could have caused such a change in what makes South Africans happy. Even white South Africans, who benefited the most from Apartheid, had an increase in life satisfaction driven largely by changes in how their happiness is determined, not by measurable improvements in their living conditions.

The findings in this paper also provide insights to the nature of happiness outside of South Africa. The models of well-being considered here are largely in line with past models of happiness, especially models that do not include personality traits. Yet it appears that a large event like the end of Apartheid can be far more important in determining happiness than the other, apparently more minor, factors most often considered. This suggests that large improvements in clearly non-economic aspects of life may be more important than income, employment, or other typical measures of economic progress.

Additionally, the evidence in this paper suggests that preferences can change substantially over time. This study cannot attribute the cause of this change directly to the end of Apartheid, but it seems a likely factor. Regardless of the cause, though, policy makers ought to account for changes in the preferences of their constituents. A good example is education, which is clearly more important in determining happiness in 1998 than 1993. If a better education helps improve the lives of South Africans more in 1998, policy makers would be seriously mistaken to treat education as if its rewards to happiness were as small as they were in 1993.

Given the findings of this paper and the fact that the largest change in the country and time period considered was the end of a severely discriminatory and unfair system of government, I believe this paper provides evidence that the process of government matters more than is often thought. If the outcomes of government were much more important than the fairness of the process, these results suggest that South Africans would not be much happier in 1998 than they were in 1993. Clearly that is not the case. And while it is likely not surprising that black South Africans would be much happier after the end of Apartheid, the data show that all South Africans, on average, are happier. Why should a white South African, or an Indian or Asian South African, be happier in 1998 than 1993 when their living conditions have not really improved, their incomes are stagnant, and unemployment levels persist? Because living in a fair society might just be better than living in a productive society.

Chapter 3. Journal Article

I. Introduction

From 1993 to 1998 in South Africa, a period spanning the end of Apartheid, there was a huge change in the distribution of reported life satisfaction. The percentage of South Africans reporting neutral or better life satisfaction increased not only for blacks but for every racial group in South Africa. For the overall population, the percentage reporting dissatisfaction with their lives as a whole dropped by nearly 50 percent. Annual survey data that includes information on subjective well-being from South Africa over this period provides an opportunity to evaluate how the determinants of happiness have changed over time. The period considered includes the end of Apartheid, which is a possible explanation for some of the significant changes in how household life satisfaction in South Africa is determined. The application of a Oaxaca decomposition (Oaxaca, 1973) illuminates changes in the way that household life satisfaction is determined and allows subjective well-being to be examined in a different framework.

Apartheid resulted in a system significantly advantageous to whites, including a more extensive welfare system, better education, and the reservation of jobs. This system intentionally combated poverty amongst whites at the expense of blacks and other racial groups. The release of imprisoned black leaders and the legalization of previously banned black congresses initiated the dismantling of Apartheid in the late 1980s and early 1990s. In 1994, Nelson Mandela was elected president in the first all-race elections in South Africa's history.

The economic and living conditions of most South Africans did not improve in the five years following the end of Apartheid. The end of legal discrimination against black South Africans, who make up three-fourths of the South African population, might

be expected to bring about significant changes in the lives of everyone involved. However, in the household level data employed here, it is difficult to see improvements in South African living conditions. Traditional economic theory suggests that giving a large portion of any population more freedoms, rather than preventing the majority of them from participating in productive sectors of the economy, would help the economy through greater labor force participation and mobility. In the case of South Africa in the mid 1990s, though, this does not appear to have occurred.

Given that most measures of living conditions show that South Africans were, on average, no better off in 1998 than they were in 1993, it is startling to see that many more report higher satisfaction with their life in 1998 (Figure 1). Figure 2 shows clear differences when these results are examined by race, with black South Africans showing the largest increases in reported life satisfaction.

Figure 1. Distribution of Reported Life Satisfaction in South Africa (1 low, 5 high)

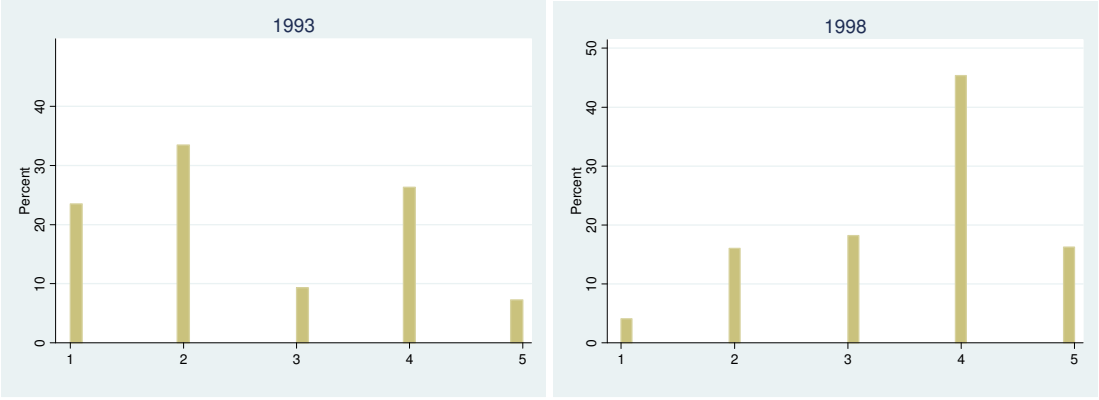
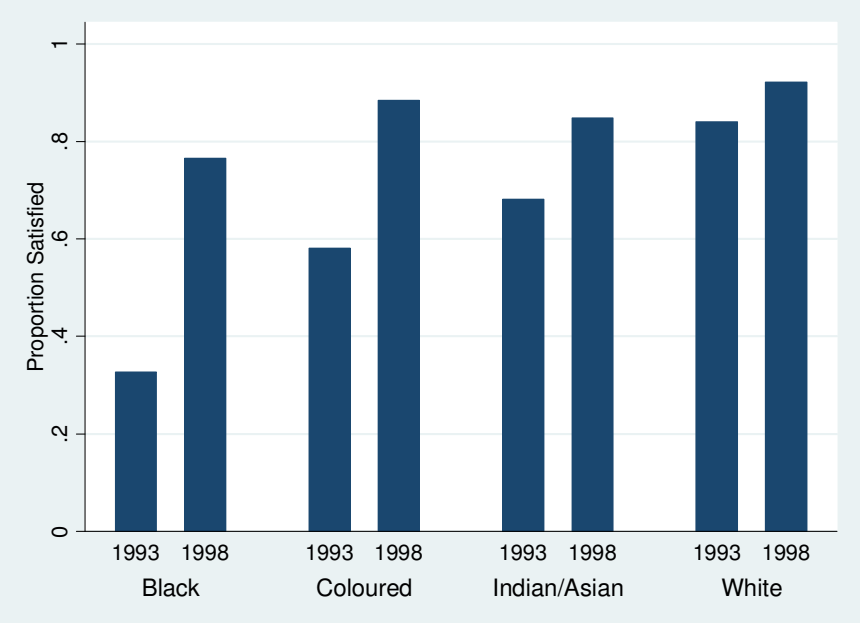


Figure 2. Percentage of South Africans reporting neutral or better life satisfaction, by race and year



The percentage of South Africans reporting neutral or better life satisfaction nearly doubled from 1993 to 1998. Only 32.6 percent of black South Africans reported neutral or better life satisfaction in 1993 but fully 76.6 percent reported so in 1998. The percentages improved for all of the other racial groups as well with coloureds, Indians/Asians, and whites seeing increases of 30.3, 16.6, and 8.1 percentage points, respectively.

The rest of this paper explores these changes. Section II reviews the related literature. Section III presents the data, followed by a discussion of the empirical strategy in Section IV. The empirical results are presented in Section V, and Section VI concludes.

II. Review of Related Literature

There are a number of reasons for economists to study happiness. Veenhoven (1984) and Ng (1996) provide empirical evidence in support of the idea that happiness is

the main objective of most, or even all, people. Clark et al. (2008, p 137) argue that a number of economic topics such as individual savings, education, and career decisions, and wage and tax policies, could be improved through happiness research. Clark and Oswald (1994)'s find, supported by Oswald (1997) and Di Tella et al. (2001), that the subjective cost of unemployment is much greater than the associated loss of income. Ferrer-i-Carbonell and Frijters (2004), Helliwell (2003), Kahneman et al. (2004), Kahneman and Krueger (2006), Ng (1997), Sen (2000), and Veenhoven (2002), among many others, provide in-depth discussions of why the study of subjective well-being can inform policy decisions and, consequently, improve the lives of people around the world.

Though we are far from a precise understanding of the nature of happiness, past research has found some consistent relationships. Many studies on happiness have focused on wealth, health, family, education, and employment, and their connections with happiness. Particular attention has been paid to the effects of both income and employment on happiness. Other studies have focused on less obvious conditions and events suspected to play a role in determining an individual's well-being. Personality traits, expectations about the future, and memories of the past are good examples of individual characteristics that might not be obvious determinants of happiness but that researchers have considered.

Health, education, income, housing, and marriage are some of the most often considered factors found to have positive relationships with happiness. Van Praag et al. (2003) find that satisfactions with finances, job, and health, in that order, have the strongest connection to overall life satisfaction. The relationship between happiness and education appears to be positive but weaker than might be expected (Fuentes and Rojas,

2000; Helliwell, 2003). However, the effects of education on happiness are sometimes thought to be indirect. That is, they occur through other channels because higher education is thought to correspond with such things as higher income and better health. Van Praag et al. (2003) report that with higher education comes a more critical outlook of one's housing conditions, or alternatively, that higher education brings higher expectations that are then harder to meet. Many studies find positive correlations between marriage and happiness (e.g. Argyle, 1999; Veenhoven, 1994; Helliwell, 2003). Contrary to what many parents might say, having children does not seem to have a very strong effect on subjective well-being (Cantril, 1965). In fact, Glenn and Weaver (1979) find that in the U.S. the effect of children on happiness appears, though small, to be negative. Others have found that children have, on average, a small positive effect on happiness for individuals above certain income levels, but a negative effect at lower levels of income (Plug, 1997).

Results on the connection between age and happiness have not been overwhelmingly similar. Several studies have found no consistent connection between age and well-being (e.g. Diener and Myers, 1995, and Diener et al., 1999). Others have found that being of relatively high or low age corresponds to higher levels of happiness whereas the middle-aged report lower levels of life satisfaction (Blanchflower and Oswald, 2004).

Unemployment is associated with a significant decrease in life satisfaction (Clark and Oswald, 1994; Oswald, 1997; Di Tella et al., 2001). However, it is often difficult to determine from the data the length of unemployment and therefore what adaptation effects may exist. Helliwell (2003) finds that unemployment has a larger negative effect

on happiness for individuals in developed countries, suggesting that unemployed individuals in developing countries, where unemployment is often higher and longer-lasting, are more adapted to unemployment and this lessens the negative effect of unemployment on subjective well-being

Economic theory suggests that utility, and thus subjective well-being, is affected by income. Easterlin (2001, p 468) states that "…in every representative national survey ever done a significant positive bivariate relationship between happiness and income has been found." His 1974 article, which describes the "Easterlin paradox," is largely credited with fueling the research interest in the relationship between life satisfaction and income. The paradox arises from the substantial growth of real income in the western world in the second half of the 20th century without any corresponding rise in reported levels of happiness.

The Easterlin paradox has prompted consideration of many ways to include material well-being in models of happiness. Richins and Dawson (1992) and Kasser and Ryan (1993) found that individuals who value financial means more than other goals are likelier to report lower levels of happiness. Scitovsky (1976) theorizes that this is because a focus on materialistic goals actually interferes with the goals that those materials are imagined to achieve. Others have postulated that income gains affect happiness only up to a certain level and that above this level the influence of income on happiness greatly diminishes (e.g. Lane, 2000). Diener et al. (1999) conclude that empirical results have not supported any causal relationship between income and well-being, though they concede that income generally seems to correlate positively with happiness.

A number of recent studies have attempted to explain the Easterlin paradox by considering the effects of relative income. Easterlin (1995) himself believes that increases in welfare from raising the income of all are "offset by the negative effect of higher living level norms brought about by the growth in incomes" (p 36). A number of studies have found a negative relationship between an individual's happiness and the wealth of peer groups (e.g. McBride, 2001; Ferrer-i-Carbonell, 2005; and Luttmer, 2005). Ferrer-i-Carbonell (2005) discovers that the comparison is 'upward,' meaning that individuals whose income is lower than the comparison group have lower levels of well-being as a result but that those with incomes higher than the comparison are not happier due to their above-average incomes.

While intuition, and the studies just discussed, suggests that an increase in comparison group income would correspond to a decrease in well-being, Bookwalter and Dalenberg (2009) find surprising results in South Africa. They find that not only does an increase in one's own income correspond to a slight increase in well-being, so too does an increase in the median income of a geographical comparison group. They conclude that at the very low levels of income and expenditure common in South Africa, "the benefit of living among wealthier people and the public goods it brings outweighs the negatives associated with being the poorest of a peer group" (p 3). Kingdon and Knight (2007) also find in South Africa that the income of close neighbors relates positively to household well-being.

Helliwell (2003) considers differences in societal tendencies and qualities of governance as determinants of life satisfaction. He examines qualities of governance through measures of stability and lack of violence, voice and accountability, government

effectiveness, the regulatory framework, the rule of law, and corruption. He finds that national levels of interpersonal trust have a significant positive effect on subjective well-being and that there are "substantial well-being benefits from improvements in the quality of governance" (p 347). These results make intuitive sense: government plays a role in determining well-being through the quality of services provided to citizens. Unfortunately, information on these characteristics of the South African population is not included in the dataset used in this study. But it is easy to imagine that the end of Apartheid would affect such things as interpersonal trust, or the equality of governmental services for different races, suggesting that the end of Apartheid could bring about serious changes in subjective well-being in South Africa.

While many authors maintain their usefulness in understanding some aspects of what makes people happy, models of subjective well-being often have low explanatory power. Diener (1984), however, found that the inclusion of personality types or traits greatly improves a model's explanatory power. He argued that while demographic and socioeconomic factors often could only explain 15 percent of the variation in happiness, an individual's genes and personality traits could explain as much as 80 percent. Diener and Lucas (1999) also determined that personality traits are the best predictors of happiness. Some people, it seems, are naturally programmed to be happier. But personality traits, even if they are large determinants of life satisfaction, certainly make a poor target for public policy. The exclusion from this study of such time-invariant information as personality traits is not of great concern because this paper focuses on changes in the determinants of happiness over time.

III. Data

The data used in this paper include two separate cross-sections from household surveys conducted in South Africa in 1993-1994 and 1998. Though this dataset has some shortcomings compared to panel datasets, it is much more useful than a single cross-section. The use of two similar cross-sectional surveys allows for a more complete understanding of happiness, its determinants, and how these things have changed over time.

The 1993-1994 survey (hereafter: SALDRU) was conducted by the South African Labour and Development Research Unit at the University of Capetown and supported by the World Bank's Project for Statistics on Living Standards and Development (South Africa Labour Development Research Unit, 1994). Approximately 9,000 households were surveyed in late 1993 and early 1994. The 1998 data (hereafter: OHS) are from Statistics South Africa's October Household Survey, conducted each year from 1995 to 1999 (Statistics South Africa, 1998). The data from 1998 were chosen because they provide the largest temporal gap from 1993 for which the majority of variables, particularly those involving subjective well-being, are comparable to the SALDRU data. Over 100,000 individuals, making up nearly 20,000 households, were surveyed. In both years the survey was conducted in person at the site of the household's dwelling.

Many variables in the two surveys considered are directly comparable, and adjustments have been made to ensure an appropriate comparison. Most of the relevant questions were worded similarly in each survey. The only frequent problem regarding the comparability of the data between surveys came from changes in the categorization of the answers. In these cases the categories have been condensed so that responses from both

surveys could be categorized in the same way. The original categories, along with the condensed categories used for this paper and the complete list of variable names, labels, and definitions, can be found in Appendix A. In some of the OHS cases, income was reported by bracket rather than the actual income amount. These values have been estimated using the mean of the bracket. For the top bracket, which has a floor but no ceiling, values were estimated using the floor of the bracket plus the size of the previous bracket. This is an arbitrary, though reasonable, choice that affects less than 0.03 percent of the OHS data.

Life satisfaction in both surveys was reported at the household level. The head of the household was asked, "Taking everything into account, how satisfied is this household with the way it lives these days?" Responses were given on a scale with five categories: very dissatisfied (1), dissatisfied (2), neutral (3), satisfied (4), and very satisfied (5). Bookwalter, Fuller, and Dalenberg (2006) suggest that the head accurately represents the household.

Because the dependent variable reflects household-level life satisfaction, characteristics of individual household members have been collapsed to the household level. The income measure used is the log of household income per household member and is measured in one-thousand Rand with 2008 as the base year. Household levels of education are captured through a measure of the highest level of education achieved by the most educated household member, the number of household members who have completed high school, and the number of children in the household not currently attending school. Unemployment is measured as the number of household members over 16 years old that were unemployed in the week preceding the survey. An estimate of

illness and injury captures the total number of household members ill or injured in the two weeks leading up to the survey. Table 1 presents the descriptive statistics.

Table 1. Descriptive Statistics

	1993 mean	1993 sd	1998 mean	1998 sd	Percent change
Life Satisfaction	2.60	1.29	3.54	1.07	36%
HH Characteristics					
Number of people in HH	5.17	3.39	4.39	2.67	-15%
Number of HH adults	3.02	1.82	2.56	1.42	-15%
Average HH age	29.39	12.26	30.22	14.00	3%
Live alone?	0.13	0.34	0.13	0.34	-3%
Number of HH males	2.50	1.83	2.05	1.50	-18%
HoH male?	0.72	0.45	0.62	0.49	-14%
HoH married?	0.58	0.49	0.42	0.49	-29%
Urban environment?	0.54	0.50	0.56	0.50	3%
Education (base: none)					
None	0.04	0.19	0.04	0.19	7%
Low (up to high school)	0.39	0.49	0.36	0.48	-7%
Some high school	0.45	0.50	0.49	0.50	10%
Completed high school	0.10	0.30	0.07	0.26	-27%
Completed bachelor's degree	0.03	0.18	0.04	0.19	20%
Number of high school grads	0.18	0.54	0.15	0.46	-18%
Number of children not in school	0.09	0.37	0.21	0.52	133%
Housing (base: shack)					
Shack	0.10	0.30	0.10	0.30	0%
House	0.59	0.49	0.69	0.46	16%
Poor quality	0.31	0.46	0.16	0.37	-47%
Other	0.00	0.04	0.05	0.22	3058%
HH owns dwelling?	0.67	0.47	0.75	0.43	12%
Rooms per person	1.16	1.11	1.25	1.08	8%
Cooking energy (base: gathered fuel)					
Gathered	0.29	0.45	0.22	0.42	-23%
Burn (coal/charcoal/paraffin)	0.26	0.44	0.23	0.42	-13%
Electricity	0.42	0.49	0.52	0.50	25%
Gas	0.03	0.17	0.03	0.16	-13%
Other	0.00	0.03	0.00	0.04	14%
Sanitation (base: bucket or no toilet)					
Bucket or none	0.18	0.38	0.17	0.37	-6%
Flush toilet	0.48	0.50	0.51	0.50	5%
Latrine	0.34	0.47	0.33	0.47	-4%

Water access (base: haul)					
Haul	0.42	0.49	0.33	0.47	-21%
Easy access outside	0.22	0.41	0.29	0.45	35%
Water piped into dwelling	0.36	0.48	0.38	0.48	4%
Income and employment					
Avg monthly income (1000 rand)	1.24	3.68	1.06	2.93	-15%
Log avg monthly income	0.003	1.00	-0.10	0.97	-2972%
Number of unemployed HH	1.84	1.66	1.86	1.54	1%
Average hours worked (week)	18.14	17.89	17.42	19.15	-4%
Illness, injury, and crime					
Number ill or injured (2 weeks)	0.39	0.69	0.18	0.36	-54%
HH member murdered this year?	0.01	0.08	0.01	0.11	69%
HH member robbed this year?	0.06	0.24	0.08	0.27	30%
Race (base: White)					
White	0.14	0.35	0.12	0.32	-16%
Black	0.75	0.43	0.75	0.43	0%
Coloured	0.08	0.27	0.11	0.31	35%
Indian/Asian	0.03	0.17	0.02	0.15	-24%
n	7650		17823		

HH stands for Household; HoH for Head of Household.

Though the 1998 conditions are clearly not identical to those in 1993, there is little obvious improvement. Most measures have increased or decreased by less than 20 percent and related measures often show changes in opposing directions. For example, more households have a member with a bachelor's degree yet the numbers of children not attending school has increased. Similarly, average household age has gone up but households have fewer adults. However, income and unemployment have changed consistently with each other and are both worse in 1998. Yet reported life satisfaction is nearly one full point higher (on the five point scale) in 1998 than 1993.

IV. Empirical Strategy

To examine the change in reported levels of life satisfaction, models with the same independent variables are estimated for 1993 and 1998. The set of independent variables is based on those commonly used in modeling subjective well-being and

includes measures of income, housing, health, education, employment, and race. Additionally, variables denoting urban/rural living environment, whether any household members have been the victim of a recent crime, household size, marital status, and number of adults and children are included.

The first round of estimations employs a linear regression of life satisfaction rated on a five-point scale. As such, the estimated coefficients can be interpreted as the change on the five-point life-satisfaction scale resulting from a one-unit change in the respective independent variable. The model can be written:

$$LifeSatisfaction_i = \alpha + \beta * House_i + \gamma * HouseholdCharacteristics_i + \delta * Income_i + \omega * Employment_i + \phi * Health_i + \varphi * Race_i + \lambda * Crime_i + \varepsilon_i, \quad (1)$$

where ε_i is an error term, and *i* represents the i^{th} household in the study.

After estimation of the models, a Oaxaca decomposition is applied to divide the changes in reported life satisfaction from 1993 to 1998 into two groups: the portion due to changes in living conditions, education, and other measurable characteristics (the endowments effect), and the portion due to changes in the way that a household's subjective well-being is determined by given levels of endowments (the coefficients effect). Separate decompositions by race are considered as well as an overall decomposition including all races. For further discussion of the Oaxaca decomposition, see Oaxaca (1973) or Borjas (2008).

The ordered nature of the dependent variable allows the use of an ordered model. Moving from a '1' to a '2' on a five-point scale of life satisfaction may not be the same as moving from, say, a '4' to a '5,' and therefore a linear model may not be appropriate. In light of this, an ordered logit model is also considered. The Oaxaca decomposition for the ordered model is done following Bauer and Sinning (2008) and Sinning et al. (2008).

It is unclear if either model type is significantly better than the other. Ferrer-i-Carbonell and Frijters (2004) examine the effects of modeling methodology on estimates of the determinants of life satisfaction and find that the estimates from a linear model differ surprisingly little from a fixed-effect ordered logistic model. They conclude that assuming cardinality of satisfaction responses "makes little difference to the results" (p 642). Helliwell (2003) finds that the change from one level of happiness to the next is the same across the entire scale and that "the results do not depend importantly on whether the measures of subjective well-being are treated as ordinal or cardinal" (p 354). It seems reasonable that the respondent's own ideas as to the ordinality or cardinality of such scales would influence his answer. Accordingly, both model types are considered without a claim as to which is better.

V. Empirical Results

Linear estimation results with robust standard errors are presented in Table 12. The models have many similarities, but there are some interesting changes from 1993 to 1998. Overall, the linear estimation results in this study are in line with past models of subjective well-being.

Table 12. Linear Regression Results for Selected Variables, 1993 and 1998

	1993	1998
Urban environment?	-0.169***	-0.113***
	(0.05)	(0.03)
Education - low	-0.019	0.045
	(0.08)	(0.04)
Education – some high school	0.081	0.121**
	(0.09)	(0.04)
Education – completed high school	0.156	0.168*
	(0.11)	(0.07)
Education – completed bachelor's	0.533***	0.211*
	(0.14)	(0.09)
Number of high school grads	0.045	0.027

	(0.05)	(0.04)
Number of children not in school	-0.020	-0.029
	(0.04)	(0.02)
Housing - house	0.203***	0.241***
	(0.05)	(0.03)
Housing - poor	0.461***	0.147***
	(0.06)	(0.04)
Housing - other	0.512	0.280***
	(0.36)	(0.05)
Cooking energy - burn	0.161***	-0.049
	(0.04)	(0.03)
Cooking energy - electricity	0.349***	0.214***
	(0.06)	(0.03)
Cooking energy - gas	0.388***	0.120*
	(0.09)	(0.06)
Cooking energy - other	0.410	0.713***
	(0.39)	(0.19)
Water - easy access outside	0.097	0.156***
	(0.05)	(0.02)
Water - piped into dwelling	0.136	0.174***
	(0.07)	(0.04)
Log average monthly income	-0.052**	0.037***
	(0.02)	(0.01)
Number of unemployed adults	-0.063***	-0.072***
	(0.02)	(0.01)
Black	-1.172***	-0.118***
	(0.06)	(0.03)
Coloured	-0.613***	0.048
	(0.07)	(0.03)
Indian/Asian	-0.306***	-0.005
	(0.09)	(0.05)
constant	2.649***	3.125***
	(0.14)	(0.07)
Controls for household characteristics including size, average age, gender, dwelling ownership, sanitation, average hours worked, illness and injury, and crime victimization		
N	7650	17823
F	69.75	48.25
p	0.000	0.000
BP^ statistic	210.47	458.63
BP^ p-value	0.000	0.000
Adjusted R-squared	0.207	0.083

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors are in parenthesis.
^ Breusch-Pagan test for heteroskedasticity on the models before using robust standard errors

From 1993 to 1998 the effect of income on well-being, though tiny in both years, switches from negative to positive. It is statistically significant in both cases. In the 1993 data, a one percent increase in income implies only a 0.00052 point decrease, on the five-point scale, in the expected life satisfaction response. In 1998, the same one percent

increase in income implies a 0.00037 point increase in life satisfaction. In other words, a household would need an increase in income per household member of over 2700 percent for a one point increase in life satisfaction. Compared to the effects of the other variables these are quite small and suggest that income has nearly no role in determining life satisfaction in South Africa during the period considered. The number of unemployed adults in a household has the expected (and statistically significant) negative correlation with happiness. This relationship is stronger in 1998 than in 1993, though it is more consistent over time than most other relationships examined in this paper.

In both years, the direction and magnitudes of the estimated coefficients on the education variables suggest that higher levels of education correspond with higher levels of subjective well-being. In 1993, though, only the estimated coefficient corresponding to completion of a bachelor's degree is statistically significant. In 1998, in addition to the completion of a bachelor's degree, the completion of all or even just some high school has a statistically significant positive relationship with happiness. Also worth noting is that while completion of a bachelor's degree in 1993 corresponds to a life satisfaction 0.53 points higher on the five point scale, all else equal, this drops to only 0.21 points higher in 1998. Taken all together, it appears not only that education plays a stronger role in determining happiness in 1998 than in 1993 but that in 1998 the effects are more evenly distributed across the educational spectrum.

Race is the most revealing independent variable included in these models. Given the historical context and the timeframe that the data represent, this is not surprising. In 1993, being black corresponds to a reported life satisfaction 1.17 points lower on the five-point scale than being white, all else constant. By 1998 this drops to 0.12 points lower

than whites. Being coloured or Indian/Asian in 1993, relative to being white, also has negative correlations with happiness. Relative to being white, being coloured in 1993 corresponds to a reported life satisfaction of 0.61 points lower. Being Indian/Asian corresponds to 0.31 points less. These negative effects disappear almost completely in 1998. While the relationships between racial groups and happiness described above should not be surprising in the context of Apartheid, the magnitude of the changes from 1993 to 1998 is remarkable. The negative relationship from being coloured or Indian/Asian and living under Apartheid is sizable yet it disappears almost completely with Apartheid's end. And while there is still a negative relationship between life satisfaction and being black, relative to being white, it is substantially (nearly 90 percent) smaller in 1998.

There is a variety of housing types and distilling them into a relatively small number of categories loses a large amount of information. Moller and Saris (2001) find that rural blacks report higher satisfaction with their housing, despite a higher percentage of them living in traditional mud huts, as opposed to the shacks more typical of urban blacks. Given this, and the inclusion of an unfortunately large 'other' housing category, it is difficult to make conclusions regarding housing. Despite the stronger relationship in 1993 of living in poor quality housing than living in a house, the overall relationship between housing and happiness represented in these models is in line with the idea that housing quality relates positively with life satisfaction.

Improved access to water and better sources of cooking energy correspond with higher life satisfaction. Strangely, though, the relationship between cooking energy source and happiness is weaker in 1998 than 1993, while the relationship between

happiness and ease of access to clean water is stronger in 1998 than 1993. This suggests a shift in the relative importance of these factors in determining happiness.

The models show little effect on household life satisfaction from the makeup of the household. But while the household makeup matters little, illness or injury of a household member in the two weeks preceding the survey does correspond to a decrease in the household's subjective well-being. A statistically significant negative relationship also exists from having a household member that is the victim of a robbery. In both cases the strength of this relationship more than doubles from 1993 to 1998. In other words, the negative effects on well-being from an illness, injury, or robbery are more than twice as strong in 1998 as they are in 1993.

As discussed previously, using a linear model assumes that the categories of the subjective well-being scale are evenly spaced. Using an ordered model relaxes that assumption. The estimated marginal effects from ordered logit models of life satisfaction for each year, using the same independent variables as the linear models discussed above, are presented in Tables 4 and 5. Marginal effects were calculated using Stata's mfx2 command (Williams, 2007). Full regression results from the ordered logit models, and the associated measures of fit, are found in Appendix C.

Table 4. Selected Marginal Effects for Ordered Logit Model -1993

	very dissatisfied	dissatisfied	neutral	satisfied	very satisfied
Urban environment?	0.037**	0.020**	-0.007**	-0.039**	-0.011**
Education - low	0.002	0.001	-0.000	-0.002	-0.000
Education – some high school	-0.023	-0.013	0.004	0.024	0.007
Education – completed high	-0.038	-0.025	0.006	0.044	0.013
Education – completed BA	-0.108***	-0.109***	0.006	0.151***	0.061**
Number of high school grads	-0.011	-0.006	0.002	0.012	0.003

Number of children not in school	0.006	0.003	-0.001	-0.006	-0.002
Housing - house	-0.061***	-0.030***	0.011***	0.063***	0.017***
Housing - poor	-0.115***	-0.080***	0.016***	0.135***	0.043***
Housing - other	-0.100	-0.101	0.006	0.139	0.056
Cooking energy - burn	-0.034***	-0.021**	0.006***	0.038***	0.011**
Cooking energy - electricity	-0.073***	-0.042***	0.013***	0.080***	0.023***
Cooking energy - gas	-0.076***	-0.064***	0.008***	0.098***	0.034**
Cooking energy - other	-0.071	-0.060	0.008***	0.092	0.032
Water - easy access outside	-0.019	-0.011	0.003	0.021	0.006
Water - piped into dwelling	-0.032	-0.018	0.006	0.035	0.010
Log average monthly income	0.015***	0.008***	-0.003***	-0.016***	-0.005***
Number of unemployed adults	0.016***	0.008***	-0.003***	-0.016***	-0.005***
Black	0.224***	0.205***	-0.005	-0.284***	-0.141***
Coloured	0.190***	0.022***	-0.039***	-0.141***	-0.032***
Indian/Asian	0.088***	0.025***	-0.018**	-0.076***	-0.019***

Controls for household characteristics including size, average age, gender, dwelling ownership, sanitation, average hours worked, illness and injury, and crime victimization

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5. Selected Marginal Effects for Ordered Logit Model -1998

	very dissatisfied	dissatisfied	neutral	satisfied	very satisfied
Urban environment?	0.006***	0.022***	0.016***	-0.020***	-0.024***
Education - low	-0.003	-0.011	-0.008	0.010	0.012
Education – some high school	-0.008**	-0.028**	-0.019**	0.025**	0.029**
Education – completed high	-0.010**	-0.034*	-0.027*	0.028**	0.043*
Education – completed BA	-0.011**	-0.042**	-0.034*	0.031***	0.055*
Number of high school grads	-0.003	-0.010	-0.007	0.009	0.010
Number of children not in school	0.002	0.006	0.004	-0.005	-0.006
Housing - house	-0.015***	-0.050***	-0.032***	0.048***	0.049***
Housing - poor	-0.008***	-0.027***	-0.020***	0.023***	0.031***
Housing - other	-0.014***	-0.052***	-0.043***	0.036***	0.073***
Cooking energy - burn	0.004*	0.012*	0.008*	-0.011	-0.012*
Cooking energy - electricity	-0.013***	-0.045***	-0.030***	0.041***	0.047***
Cooking energy - gas	-0.007*	-0.025*	-0.019*	0.021**	0.030*
Cooking energy - other	-0.027***	-0.110***	-0.118***	-0.025	0.280*
Water - easy access outside	-0.009***	-0.032***	-0.023***	0.028***	0.036***
Water - piped into dwelling	-0.011***	-0.037***	-0.026***	0.032***	0.041***
Log average monthly income	-0.002***	-0.008***	-0.006***	0.008***	0.009***
Number of unemployed adults	0.004***	0.015***	0.010***	-0.014***	-0.016***
Black	0.007***	0.024***	0.017***	-0.021***	-0.027***
Coloured	-0.002	-0.008	-0.006	0.007	0.009

Indian/Asian	-0.001	-0.003	-0.002	0.002	0.003
Controls for household characteristics including size, average age, gender, dwelling ownership, sanitation, average hours worked, illness and injury, and crime victimization					

$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

The relationships revealed by the ordered logit models are very similar to those found in the linear models. With only one minor exception, the relationships between life satisfaction and each independent variable in the ordered models have the same sign as the estimates from the linear models.

In the ordered model for 1993 the independent variables with the strongest relationships to happiness match those from the 1993 linear model. Race is by far the best predictor of happiness. Being black, relative to white, in 1993 corresponds to a 22.7 percentage point increase in the likelihood of the lowest response on the happiness scale and a 15.6 percentage point decrease in the likelihood of a "very satisfied" response. The relationships for coloureds and Indians/Asians, as in the linear model, are slightly smaller. Education and housing in the 1993 ordered model play the same roles in predicting happiness as they do in the 1993 linear model. Though income has a statistically significant negative relationship with happiness, as in the linear model, it is still quite small.

The best predictors in the 1998 ordered model remain race, education, and housing. The effects from race, again, are weaker in 1998 than 1993. As in the linear models, lower levels of education emerge as stronger predictors of happiness in 1998. Completion of a bachelor's degree, though still a good predictor, no longer stands out as the only important educational measure. In both years, the ordered logit models, like the linear models, show that the household makeup matters little in determining the household's overall life satisfaction.

The accuracy of the predictions from both sets of models and both years are consistent. The percentage of correct predictions is reasonably consistent across all four models, falling within a range of 17.4 percentage points. The ordered model is the best predictor for 1993 (42 percent correct) but the worst predictor for 1998 (26 percent). The linear model correctly predicts 34 percent of the 1993 observations and 38 percent of those in 1998. As discussed previously, the predictive powers of these models are not overwhelmingly strong, but this is consistent with past modeling of life satisfaction when the data do not include information on personality type.

The data have shown that South Africans, on average, report much higher levels of life satisfaction after the end of Apartheid. The models examined suggest a changing relationship over time between happiness and living conditions but without many signs of actual improvement in the living conditions of the population. Comparing the models provides some understanding, but decomposing the change provides a much clearer picture.

Decomposing the Change in Happiness

The results of the Oaxaca decompositions are presented in Tables 10 and 11. For the ordered logit decomposition, the table includes two sets of results. One set of results is calculated using the estimated coefficients from 1998 and the second uses the 1993 estimated coefficients. Figure 2 shows how these results can be different. In this example, we assume that subjective well-being is determined only by income and the relationship is linear (this second assumption is simply for ease of depiction since the ordered logit model is clearly non-linear). In both years, assume income has a positive effect on well-

being but that this effect is stronger in Year 1 (1993 in this study) than it is in Year 2 (1998). Given the steeper slope in Year 1, using Year 1's perspective results in the attribution of a larger portion of the total change in subjective well-being to the change in endowments, as seen in the right-hand panel of Figure 3. An even steeper slope in Year 1, or a flatter slope in Year 2, would result in an even greater difference in the endowments effect between reference years.

Figure 3. Graphical Depiction of the Difference in Reference Year Choice for the Oaxaca Decomposition

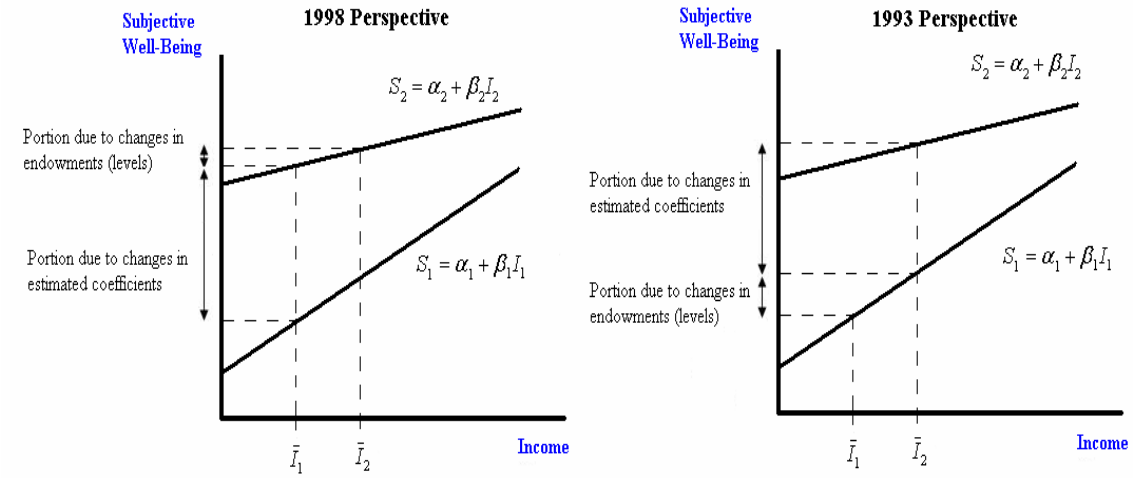


Table 10. Ordered Logit Oaxaca Decomposition

Results	Coef.	Percentage
Differential	1.012	
1998 Perspective		
Endowments	0.086	8.5%
Coefficients	0.926	91.5%
1993 Perspective		
Endowments	0.439	43.4%
Coefficients	0.573	56.6%

Though it is often difficult to determine which perspective is appropriate to use when the Oaxaca decomposition is applied to compare genders or races, as is often the

case in labor economics, it is easier in this situation. Arguments for using one race as the reference tend to be based on whether one group is being discriminated against or the other is being advantaged in some way. In the case of Apartheid in South Africa, it is clear that those in 1993 are experiencing severe discrimination not only relative to South Africans in 1998 but relative to the discrimination faced by most people in most of the world.

From either perspective, the Oaxaca decompositions reveal that the majority of the change in average levels of happiness from 1993 to 1998 is due to changes in the estimated coefficients. From the perspective of 1993, 43.4 percent of the happiness increase is due to improvements in the levels of the independent variables and 56.6 percent is due to changes in the way that given levels of these factors influence a household's well-being. Switching to 1998's perspective, only 8.5 percent of the improvement comes from changes in the levels while fully 91.5 percent is due to changes in the estimated coefficients.

Another way to think about this is to consider how happy South Africans in 1993 might expect to be if they knew how their living conditions, incomes, educations, and other factors would change over the coming five years. If they imagined that nothing would change in the way these factors make them happy but knew what their 1998 levels would be, then they would expect to be 0.41 points happier, on average, in 1998 (43.4 percent of the total happiness change of 0.94 points is 0.41 points). But in 1998, now knowing that their happiness is determined differently than it was in 1998, they would recognize that not only are they happier from improvements in the levels of their characteristics, but also that they are even happier than these improvements would have

led them to believe back in 1993. Knowing their new "happiness formula," they would recognize that their expectation of a 0.41 point happiness increase was too small. They now know that their new levels of education, income, housing, etc. increased their happiness by only 8.5 percent, but that they are 0.86 points happier due to changes in the rewards to happiness they get from given levels of the determinants of happiness.

Unlike the non-linear decomposition, Table 11 shows that changing from one reference year to the other has little qualitative effect on the linear decomposition. Following the reasons previously discussed, interpretation focuses on the results with 1998 as the reference year. The results show that only 7.1 percent of the increase in average levels of happiness from 1993 to 1998 is due to changes in the levels of the independent variables. Like the non-linear decomposition, this suggests that South Africans are happier in 1998 not because their incomes went up, or because they have higher educations, better houses, improved access to water, etc., but because having the same levels of these factors brings a greater reward, in terms of happiness, in 1998. Earlier we saw that the relationships between a number of the independent variables and happiness changed from 1993 to 1998. This decomposition reveals that these changing relationships drove 92.9 percent of the increase in happiness.

Table 11. Linear Oaxaca Decompositions (1998 as reference year)

Portion of Happiness improvement due to changes in:		
	Coefficients	Endowments
All Races	92.9%	7.1%
Black	91.6%	8.4%
Coloured	90.6%	9.4%
Indian/Asian	125.5%	-25.5%
White	75.3%	24.7%

Given that three-fourths of the South African population is black there is perhaps concern that the overall results are largely driven by the black population. Table 11 shows that the results from the linear Oaxaca decompositions run separately by race are similar to the overall results. A larger portion of the happiness increase for whites is explained by improvements in living conditions, rather than the estimated coefficients, but it is still less than one-fourth. For Indians/Asians, changes in the levels of the independent variables actually suggest a fall in reported levels of well-being. However, this fall was overcome by stronger gains in the returns to happiness seen from given levels of the independent variables.

VI. Concluding Remarks

South Africans were happier in 1998 than they were in 1993 and the results of this paper show that this improvement was mostly due to changes in the way that household and individual characteristics influence happiness. Happiness has increased in South Africa due in small part to changes in living conditions, but changes in the way that the factors of happiness influence life satisfaction account for much more of the happiness increase. This result is true not just for black South Africans, who experienced the most discrimination under Apartheid, but for all South Africans. There could certainly be a number of factors driving this change, but the end of Apartheid is the most obvious. Even white South Africans, who benefited the most from Apartheid, had an increase in life satisfaction driven largely by changes in how their happiness is determined, not measurable improvements in their living conditions.

The findings in this paper can provide insights to the nature of happiness outside of South Africa. The models of well-being considered here are largely inline with past models of happiness, especially those models that do not include information on personality traits. Yet it appears that a large event like the end of Apartheid can be far more important in determining happiness, even for those not directly harmed by Apartheid, than factors more commonly considered. This suggests that large improvements in clearly non-economic aspects of life may be far more important than income, unemployment, or other typical measures of economic progress. Additionally, the evidence in this paper suggests that preferences change substantially over time and adds to the literature showing that there are important non-economic contributors to subjective well-being.

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Appendix A
Variable Definitions and Re-categorizations

Variable Names, Labels, and Definitions

Variable Name	Variable Label	Variable Definition
adults	number of adults in HH	total number of HH members 18 years old or older
avg_age	average age	mean age of all HH members
cen_burn	cooking energy- burned fuel	coal, charcoal, or paraffin (base case: HH gathers wood or dung to burn)
cen_elec	cooking energy- electricity	electricity from the grid or a generator (base case: HH gathers wood or dung to burn)
cen_gas	cooking energy- gas	piped (town grid) or bottled gas (base case: HH gathers wood or dung to burn)
cen_other	cooking energy- other	other (including solar) (base case: HH gathers wood or dung to burn)
child_noschool	number of children in HH not enrolled in school	total number of HH members under 18 years old not enrolled in school
edu_complba	completed BA	1 if the highest level of education by any HH member is completion of a bachelor's degree (base case: no education)
edu_complhs	completed high school	1 if the highest level of education by any HH member is completion of high school (base case: no education)
edu_low	low education	1 if the highest level of education by any HH member is less than high school (base case: no education)
edu_somehs	some high school	1 if the highest level of education by any HH member is some high school (base case: no education)
hhmale	male head of HH	1 if the head of HH is male
hoursworked	average hours worked last week by HH adults	mean hours worked by all HH adults in the week before the survey
housing_hse	house	1 if the HH's dwelling is a house, part of a house, flat, apartment, maisonette, brick structure on a separate stand or yard, or a town/cluster/semi-detached house (base case: shack)
housing_other	other housing	1 if the HH's dwelling is other housing (base case: shack)
housing_poor	poor quality housing	1 if the HH's dwelling is a hut/traditional dwelling, hostel, outbuilding, combination of buildings, or a dwelling/house/flat/room in a backyard (base case: shack)
illinj_est	number of HH members ill or injured in the last 2 weeks	Estimated number of HH members that were ill or injured in the 2 weeks before the survey
inc_lreal	log(income)	average real income (base year 2008) per HH member in logarithmic form of 1000 rand

inc_real_1000s	real income in 1000 rand (2008)	average real income (base year 2008) per HH member in 1000 rand
Variable Name	Variable Label	Variable Definition
livealone	live alone	1 if HH is made up of only one member
males	number of males in HH	total number of males in HH
married	head of HH is married	1 if head of HH is married
murder	HH member murdered this year	1 if a HH member was murdered in the 12 months before the survey
num_compl_hs	number of HH members that completed high school	total number of HH members that have completed high school
ownership	HH owns dwelling	1 if the HH owns its dwelling
race_1	Black	1 if HH is black as determined by the conductors of the survey (base case: White)
race_2	Coloured	1 if HH is Coloured (of partially Black ancestry) as determined by the conductors of the survey (base case: White)
race_3	Indian/Asian	1 if HH is Indian or Asian as determined by the conductors of the survey (base case: White)
robbery	HH member robbed this year	1 if a HH member was robbed in the 12 months before the survey
roomsperperson	number of rooms per person	number of rooms in HH's dwelling
sanit_flush	flush toilet	1 if HH has a flush toilet (base case: bucket toilet or no toilet)
sanit_latrine	latrine	1 if HH uses a latrine (base case: bucket toilet or no toilet)
sizehh	number of people in HH	total number of people that normally reside 4 nights or more per week in the dwelling
unemp_num	number of unemployed HH adults	total number of HH adults that did not have a job in the week before the survey
unemp_perc	percentage of HH adults unemployed	percentage of HH adults that did not have a job in the week before the survey
urban	urban	1 if the HH lives in an urban or peri-urban environment
wat_easyout	easy access to water outside	1 if the HH has a rainwater or other tank, well, or piped water in their yard (base case: water must be hauled from a distance)
wat_pipedin	water piped in to dwelling	1 if the HH has water piped directly in to the dwelling (base case: water must be hauled from a distance)

Recoding of some Variable Categories – Original and New Categories

Housing Categories

New	Original	
	SALDRU	OHS
House	house/part of a house	dwelling/house or brick structure on a separate stand or yard
	flat	flat or apartment in a block of flats
	maisonette	town/cluster/semi-detached house
Poor	hut/traditional dwelling	traditional dwelling/hut/structure made of traditional materials
	hostel	dwelling/house/flat/room in backyard
	outbuilding	room/flatlet
	combination of buildings	unit in retirement village
Shack	Shack	informal dwelling/shack, in backyard
		informal dwelling/shack not in back yard, e.g. in an informal squatter settlement
		caravan/tent
Other	other	other

Water Source Categories

New	Original	
	SALDRU	OHS
Piped in	piped - internal	piped water, in dwelling
Easy access outside	piped - yard tap	piped water, on site or in yard
	water carrier/tanker	water carrier/tanker
	rainwater tank	borehole on site
		rainwater tank on site
Haul	public tap (free)	public tap
	public tap (paid for)	borehole off site/communal
	borehole	flowing water stream
	flowing river/stream	dam/pool/stagnant water
	dam/stagnant water	well
	well (non-borehole)	spring
	protected spring	other
	other	

Cooking Energy Source Categories

New	Original	
	SALDRU	OHS
Electricity	electricity from grid	electricity
	electricity from generator	
Gas	town gas (piped)	gas
	gas from bottle	
Burn (other than wood, dung)	charcoal/coal	coal
	paraffin	paraffin
Gathered	wood	wood
	dung	dung
Other	other	Other

		solar
	Sanitation Categories	
New	Original	
	SALDRU	OHS
Flush	flush toilet	flush toilet
Latrine	improved pit latrine (with ventilation)	pit latrine (with ventilation)
	other pit latrine	other pit latrine
	chemical toilet	chemical toilet
Minimal	bucket toilet	bucket toilet
	none	none
		other pit latrine
		other

Appendix B
Full Oaxaca Decomposition Results

Linear Oaxaca Decomposition - 1998 as reference group

	Coef.	Robust Std. Err.	z	P>z	[95% Con.	Interval]
Differential						
Prediction_1	3.537564	0.008007	441.83	0.000	3.521871	3.553256
Prediction_2	2.60366	0.014824	175.64	0.000	2.574606	2.632714
Difference	0.933904	0.016848	55.43	0.000	0.9008828	0.9669246
Decomposition						
Endowments	0.066659	0.010757	6.20	0.000	0.0455748	0.0877426
Coefficients	0.867245	0.018808	46.11	0.000	0.8303828	0.9041071

Percentage change in dependent variable due to changes in	
Endowments	7.1%
Coefficients	92.9%

Linear Oaxaca Decomposition - 1993 as reference group

	Coef.	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
Differential						
Prediction_1	2.60366	0.014824	175.64	0	2.574606	2.632714
Prediction_2	3.537564	0.008007	441.83	0	3.521871	3.553256
Difference	-0.9339	0.016848	-55.43	0	-0.9669246	-0.900883
Decomposit~n						
Endowments	0.012275	0.023161	0.53	0.596	-0.0331198	0.0576694
Coefficients	-0.94618	0.026925	-35.14	0	-0.998951	-0.893406

Percentage change in dependent var due to changes in	
Endowments	-1.3%
Coefficients	101.3%

Appendix C
Ordered Logit Model Estimated Coefficients and Measures of Fit

Estimated Coefficients

	1993 (std errors)	1998 (std errors)
satisfy		
sizehh	0.004	0.020*
	(0.01)	(0.01)
adults	0.016	-0.010
	(0.02)	(0.01)
avg_age	0.004*	0.005***
	(0.00)	(0.00)
livealone	0.193**	-0.085*
	(0.06)	(0.03)
males	0.011	-0.006
	(0.01)	(0.01)
hhmale	0.045	-0.007
	(0.05)	(0.02)
married	0.046	-0.018
	(0.05)	(0.02)
urban	-0.124**	-0.112***
	(0.04)	(0.03)
edu_low	-0.011	0.057
	(0.08)	(0.04)
edu_somehs	0.089	0.140**
	(0.08)	(0.05)
edu_complhs	0.163	0.186*
	(0.10)	(0.08)
edu_complba	0.543***	0.235*
	(0.13)	(0.10)
num_compl_hs	0.037	0.045
	(0.04)	(0.05)
child_noschool	-0.016	-0.030
	(0.03)	(0.02)
housing_hse	0.205***	0.236***
	(0.05)	(0.03)
housing_poor	0.452***	0.149***
	(0.06)	(0.04)
housing_other	0.408	0.285***
	(0.33)	(0.05)
ownership	0.137***	0.063**
	(0.03)	(0.02)
roomsperperson	0.000	0.029**
	(0.02)	(0.01)
cen_burn	0.122**	-0.047
	(0.04)	(0.03)
cen_elec	0.281***	0.215***
	(0.05)	(0.03)
cen_gas	0.329***	0.129*
	(0.08)	(0.06)
cen_other	0.355	0.832***
	(0.37)	(0.25)
sanit_flush	-0.020	-0.081*

	(0.06)	(0.04)
sanit_latrine	0.133***	0.025
	(0.04)	(0.03)
wat_easyout	0.074	0.156***
	(0.05)	(0.02)
wat_pipedin	0.117	0.179***
	(0.07)	(0.04)
inc_lreal	-0.057***	0.040***
	(0.01)	(0.01)
unemp_num	-0.060***	-0.072***
	(0.02)	(0.01)
hoursworked	0.004***	-0.000
	(0.00)	(0.00)
illinj_est	-0.047*	-0.103***
	(0.02)	(0.02)
murder	0.063	-0.135
	(0.18)	(0.08)
robbery	-0.160**	-0.327***
	(0.05)	(0.03)
race_1	-1.015***	-0.123***
	(0.06)	(0.03)
race_2	-0.543***	0.032
	(0.06)	(0.04)
race_3	-0.267***	-0.013
	(0.08)	(0.06)
cut1	-0.803	-1.423
cut2	0.202	-0.474
cut3	0.491	0.100
cut4	1.688	1.438
n	7650	17823

1993 Ordered logit model measures of fit

Log-Lik Intercept Only:	-11251.186	Log-Lik Full Model:	-10396.3
D(7610):	20792.595	LR(36):	1709.777
		Prob > LR:	0.001
McFadden's R2:	0.076	McFadden's Adj R2:	0.072
ML (Cox-Snell) R2:	0.200	Cragg-Uhler(Nagelkerke) R2:	0.211
McKelvey & Zavoina's R2:	0.203		
Variance of y*:	4.130	Variance of error:	3.29
Count R2:	0.420	Adj Count R2:	0.128
AIC:	2.728	AIC*n:	20872.595
BIC:	-47259.533	BIC':	-1387.848
BIC used by Stata:	21150.293	AIC used by Stata:	20872.595

1998 Ordered logit model measures of fit

Log-Lik Intercept Only:	-24748.311	Log-Lik Full Model:	-23979.42
D(17783):	47958.843	LR(36):	1537.779
		Prob > LR:	0.001
McFadden's R2:	0.031	McFadden's Adj R2:	0.029
ML (Cox-Snell) R2:	0.083	Cragg-Uhler(Nagelkerke) R2:	0.088
McKelvey & Zavoina's R2:	0.085		
Variance of y*:	3.596	Variance of error:	3.29
Count R2:	0.456	Adj Count R2:	0.004

AIC:	2.695	AIC*n:	48038.843
BIC:	-126105.519	BIC':	-1185.403
BIC used by Stata:	48350.373	AIC used by Stata:	48038.843

Appendix D
Comparison of Estimated Marginal Effects for Generalized Ordered Logit Model and Ordered Logit Model

	1993 gologit	1993 ologit	1998 gologit	1998 Ologit
very dissatisfied				
Number of people in HH	0.001	-0.001	-0.004***	-0.001*
Number of HH adults	-0.010	-0.004	0.002	0.000
Average HH age	0.000	-0.001*	-0.001***	-0.000***
Live alone?	-0.062***	-0.052***	0.008	0.006*
Number of HH males	-0.006	-0.004	0.001	0.000
HoH male?	0.008	-0.008	0.003	0.000
HoH married?	-0.025	-0.016	0.002	0.001
Urban environment?	-0.019	0.037**	0.019***	0.006***
Education - low	0.002	0.002	-0.003	-0.004
Education – some high school	-0.031	-0.024	-0.010	-0.009**
Education – completed high school	-0.074*	-0.040	-0.015	-0.011**
Education – completed bachelor's	-0.146***	-0.115***	-0.019	-0.013**
Number of high school grads	-0.009	-0.011	0.003	-0.003
Number of children not in school	0.006	0.006	0.003	0.002
Housing - house	-0.094***	-0.070***	-0.014**	-0.016***
Housing - poor	-0.162***	-0.131***	-0.014**	-0.010***
Housing - other	0.448*	-0.134	-0.020**	-0.019***
HH owns dwelling?	-0.071***	-0.039***	-0.010**	-0.004*
Rooms per person	0.002	0.000	-0.003	-0.002**
Cooking energy - burn	-0.003	-0.039***	-0.003	0.004*
Cooking energy - electricity	0.013	-0.076***	-0.018***	-0.013***
Cooking energy - gas	-0.043	-0.089***	-0.007	-0.008*
Cooking energy - other	-0.018	-0.085	-0.044***	-0.032***
Sanitation - flush toilet	0.048*	0.006	-0.002	0.005*
Sanitation - latrine	-0.022	-0.036***	-0.005	-0.001
Water - easy access outside	-0.001	-0.020	-0.008*	-0.010***
Water - piped into dwelling	-0.032	-0.033	-0.010	-0.011***
Log average monthly income	0.021***	0.015***	-0.002	-0.002***
Number of unemployed adults	0.022***	0.016***	0.006**	0.004***
Average hours worked (week)	-0.001**	-0.001***	-0.000*	0.000
Number ill or injured (last 2 weeks)	0.014	0.013*	0.012***	0.006***
HH member murdered this year?	0.023	-0.008	0.009	0.010
HH member robbed this year?	0.064**	0.048**	0.032***	0.025***
Black	0.216***	0.211***	0.006	0.007***
Coloured	0.075***	0.076***	-0.003	-0.002
Indian/Asian	0.000	0.030**	-0.002	-0.001
dissatisfied				
Number of people in HH	-0.001	0.000	-0.001	-0.003*

Number of HH adults	0.008	-0.002	0.001	0.002
Average HH age	-0.002*	-0.001*	-0.001***	-0.001***
Live alone?	-0.001	-0.035**	0.038**	0.019*
Number of HH males	0.000	-0.002	0.003	0.001
HoH male?	-0.021	-0.004	0.000	0.001
HoH married?	-0.004	-0.008	-0.001	0.004
Urban environment?	0.113***	0.020**	0.020*	0.022***
Education - low	0.007	0.001	0.002	-0.012
Education – some high school	0.010	-0.012	-0.007	-0.029**
Education – completed high school	0.040	-0.022	-0.017	-0.038*
Education – completed bachelor's	-0.068	-0.103**	-0.044	-0.046**
Number of high school grads	-0.017	-0.006	0.005	-0.010
Number of children not in school	0.008	0.003	0.002	0.006
Housing - house	0.021	-0.017***	-0.044***	-0.052***
Housing - poor	-0.001	-0.058***	-0.012	-0.031***
Housing - other	-0.112	-0.061	-0.042**	-0.062***
HH owns dwelling?	0.018	-0.019***	-0.026**	-0.012*
Rooms per person	0.000	0.000	-0.009*	-0.006**
Cooking energy - burn	-0.079***	-0.014**	0.016	0.013*
Cooking energy - electricity	-0.177***	-0.037***	-0.042***	-0.044***
Cooking energy - gas	-0.125***	-0.048**	-0.007	-0.027*
Cooking energy - other	-0.262	-0.044	-0.091	-0.125***
Sanitation - flush toilet	-0.099***	0.003	0.008	0.018*
Sanitation - latrine	-0.076***	-0.022***	-0.013	-0.005
Water - easy access outside	-0.043*	-0.010	-0.044***	-0.034***
Water - piped into dwelling	-0.025	-0.018	-0.043***	-0.038***
Log average monthly income	0.000	0.008***	-0.007*	-0.008***
Number of unemployed adults	0.001	0.008***	0.011**	0.015***
Average hours worked (week)	-0.001**	-0.001***	0.000	0.000
Number ill or injured (last 2 weeks)	0.010	0.007*	0.026***	0.020***
HH member murdered this year?	0.001	-0.004	0.064*	0.031
HH member robbed this year?	0.010	0.019***	0.076***	0.076***
Black	0.226***	0.215***	0.062***	0.024***
Coloured	0.139***	0.135***	-0.003	-0.007
Indian/Asian	0.134***	0.066***	0.040	-0.003
neither				
Number of people in HH	0.000	0.000	-0.002	-0.002*
Number of HH adults	0.001	0.001	-0.007	0.001
Average HH age	0.001*	0.000*	-0.001	-0.001***
Live alone?	0.031	0.008***	0.007	0.012**
Number of HH males	-0.002	0.001	-0.004	0.001
HoH male?	0.001	0.001	-0.006	0.001
HoH married?	0.007	0.003	0.007	0.003
Urban environment?	0.006	-0.007**	0.007	0.016***
Education - low	0.016	0.000	-0.025	-0.007

Education – some high school	0.020	0.004	-0.036*	-0.018**
Education – completed high school	0.018	0.007	-0.064*	-0.025*
Education – completed bachelor's	0.032	0.010**	-0.044	-0.032*
Number of high school grads	0.012	0.002	-0.002	-0.007
Number of children not in school	0.005	-0.001	0.006	0.004
Housing - house	0.006	0.015***	-0.034**	-0.031***
Housing - poor	0.020	0.024***	-0.016	-0.017***
Housing - other	-1.104***	0.024***	-0.063***	-0.038***
HH owns dwelling?	0.039***	0.007***	0.014	-0.008**
Rooms per person	-0.012**	0.000	-0.011*	-0.004**
Cooking energy - burn	0.008	0.008***	0.013	0.007*
Cooking energy - electricity	0.013	0.014***	-0.033**	-0.031***
Cooking energy - gas	-0.007	0.016***	-0.036	-0.018*
Cooking energy - other	0.279	0.015	-0.112	-0.120***
Sanitation - flush toilet	0.018	-0.001	0.038**	0.012*
Sanitation - latrine	0.036**	0.006***	0.018*	-0.003
Water - easy access outside	-0.013	0.004	-0.004	-0.022***
Water - piped into dwelling	-0.005	0.006	-0.010	-0.025***
Log average monthly income	-0.014**	-0.003***	-0.015***	-0.006***
Number of unemployed adults	-0.004	-0.003***	0.019***	0.010***
Average hours worked (week)	0.001***	0.000***	0.001**	0.000
Number ill or injured (last 2 weeks)	-0.004	-0.002*	0.001	0.014***
HH member murdered this year?	-0.055	0.001	-0.014	0.019
HH member robbed this year?	-0.013	-0.010**	0.036**	0.039***
Black	-0.024	0.002	0.001	0.017***
Coloured	0.017	0.024***	-0.026	-0.006
Indian/Asian	-0.025	0.017***	-0.072***	-0.002
satisfied				
Number of people in HH	0.000	0.001	0.004	0.003*
Number of HH adults	0.000	0.004	0.013*	-0.001
Average HH age	0.000	0.001*	0.002***	0.001***
Live alone?	0.025	0.061***	-0.051**	-0.018*
Number of HH males	0.009	0.004	0.001	-0.001
HoH male?	-0.004	0.009	0.008	-0.001
HoH married?	0.028	0.017	-0.002	-0.004
Urban environment?	-0.082***	-0.039**	-0.034**	-0.020***
Education - low	-0.019	-0.002	0.001	0.012
Education – some high school	-0.009	0.024	0.004	0.028**
Education – completed high school	0.008	0.043	0.048	0.035**
Education – completed bachelor's	0.124	0.152***	0.048	0.042**
Number of high school grads	0.010	0.012	-0.033	0.009
Number of children not in school	-0.019	-0.006	-0.002	-0.005
Housing - house	0.085***	0.058***	0.049***	0.052***
Housing - poor	0.139***	0.130***	0.010	0.032***
Housing - other	0.760***	0.134	0.067**	0.060***

HH owns dwelling?	0.010	0.040***	0.018	0.011*
Rooms per person	0.005	0.000	0.024***	0.006**
Cooking energy - burn	0.068***	0.036***	-0.017	-0.014*
Cooking energy - electricity	0.096***	0.078***	0.057***	0.040***
Cooking energy - gas	0.135***	0.095***	0.016	0.027*
Cooking energy - other	-0.076	0.089	-0.025	0.020
Sanitation - flush toilet	0.016	-0.006	-0.014	-0.016*
Sanitation - latrine	0.063***	0.040***	0.010	0.004
Water - easy access outside	0.047*	0.020	0.021	0.033***
Water - piped into dwelling	0.051	0.035	0.018	0.036***
Log average monthly income	-0.003	-0.016***	0.016**	0.008***
Number of unemployed adults	-0.015*	-0.016***	-0.026***	-0.014***
Average hours worked (week)	0.001**	0.001***	0.001	0.000
Number ill or injured (last 2 weeks)	-0.017*	-0.014*	-0.032**	-0.019***
HH member murdered this year?	-0.058	0.009	-0.050	-0.031
HH member robbed this year?	-0.057**	-0.046**	-0.093***	-0.079***
Black	-0.365***	-0.277***	-0.058***	-0.021***
Coloured	-0.175***	-0.129***	0.044*	0.006
Indian/Asian	-0.065	-0.052**	0.050	0.002
very satisfied				
Number of people in HH	0.001	0.000	0.003	0.004*
Number of HH adults	0.003	0.001	-0.008	-0.002
Average HH age	0.000*	0.000*	0.000	0.001***
Live alone?	0.008	0.019**	-0.002	-0.019**
Number of HH males	-0.001	0.001	-0.001	-0.001
HoH male?	0.016*	0.002	-0.004	-0.001
HoH married?	-0.006	0.005	-0.006	-0.004
Urban environment?	-0.019*	-0.011**	-0.012	-0.024***
Education - low	-0.005	0.000	0.024	0.011
Education – some high school	0.011	0.007	0.048**	0.028**
Education – completed high school	0.009	0.012	0.048	0.039*
Education – completed bachelor's	0.059	0.057**	0.059	0.049*
Number of high school grads	0.004	0.003	0.027*	0.010
Number of children not in school	0.001	-0.002	-0.008	-0.006
Housing - house	-0.017	0.014***	0.043***	0.047***
Housing - poor	0.005	0.035***	0.033*	0.025***
Housing - other	0.008	0.037	0.058**	0.059***
HH owns dwelling?	0.003	0.011***	0.005	0.012**
Rooms per person	0.005*	0.000	-0.001	0.007**
Cooking energy - burn	0.007	0.009**	-0.009	-0.011*
Cooking energy - electricity	0.054***	0.021***	0.035***	0.047***
Cooking energy - gas	0.040	0.027**	0.033	0.027*
Cooking energy - other	0.077	0.025	0.272*	0.258*
Sanitation - flush toilet	0.018	-0.002	-0.030*	-0.018*
Sanitation - latrine	0.000	0.012***	-0.009	0.005

Water - easy access outside	0.011	0.006	0.035***	0.034***
Water - piped into dwelling	0.010	0.010	0.044***	0.039***
Log average monthly income	-0.005	-0.005***	0.008*	0.009***
Number of unemployed adults	-0.004	-0.005***	-0.009*	-0.016***
Average hours worked (week)	0.000	0.000***	-0.001*	0.000
Number ill or injured (last 2 weeks)	-0.003	-0.004*	-0.007	-0.021***
HH member murdered this year?	0.090*	0.002	-0.009	-0.028
HH member robbed this year?	-0.004	-0.012***	-0.051***	-0.061***
Black	-0.053***	-0.151***	-0.010	-0.027***
Coloured	-0.056***	-0.106***	-0.012	0.010
Indian/Asian	-0.044***	-0.062***	-0.016	0.003
n	7650	7650	17823	17823