

*Senior Thesis*  
*Department of Economics*



“Parent Income and Life Satisfaction: the  
Comparison Income Effect”

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## **Abstract**

This paper presents an empirical analysis of the importance of comparison income. Specifically, the influence of the income of a reference group on satisfaction with life is analyzed. The main contribution of this paper is that parents of the individual are set as the reference group. The analysis uses a self-reported measure of satisfaction with life as a measure of individual life satisfaction. The data come from the National Longitudinal Survey of Youth. The study shows that the income of parents is negatively related with life satisfaction, however the result is statistically insignificant. The results also suggest that individuals are more satisfied with life the larger their income is in comparison with the income of the reference group, however this result is also statistically insignificant.

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## **I. Introduction**

Economists have long suspected utility functions are interdependent, i.e. that they depend in part on the consumption of other individuals. Not only are people different in their own evaluation of commodities, but the value function also depends on the commodities of others. Utility then, as Veblen noted, should be a function of both absolute income and relative income (1898). Yet, despite this concept of interdependent utilities, its formalization did not find much attention in economics until Easterlin noticed that the US and other Western countries had been growing in income per capita for several decades without any corresponding rise in reported happiness levels. This paradox quickly acquired the attention of researchers. The search for a solution to the Easterlin paradox has generally hovered around the idea that, beyond a minimum absolute income necessary for living, relative income becomes an important factor for explaining happiness. This would explain why in richer societies average happiness and average absolute income do not move together as expected while richer people tend to be happier than poorer people.

Building upon the explanation for such a paradox, Kahneman and Tversky showed that what matters for individuals when they make choices is not the status quo, but changes from a reference point. This can be interpreted in two ways for the study of the relative income hypothesis. The reference point can be interpreted as the reference group which can be defined as self-selected groups of peers in society (external comparison) or, alternatively, as one's own status in the past or in the future (internal comparison). In their work, Kahneman and Tversky have mainly focused on the latter, showing how the value function is concave in gains and convex in losses, and also how the value function is steeper for losses than for gains (Tversky and Kahneman, 1991).

The work of Kahneman and Tversky continues to be prevalent today, as the millennials are set to be the first generation in the U.S. to earn less than the generation prior. Research has shown that “somebody with the same degree, the same job and the same demographic profile is earning less today than they were in the 1980s” (Carrick as quoting Moos, 2013). Generation Y is facing a mountain of student debt, underemployment, and low wages. A torrent of research papers and policy suggestions have been made in response to such circumstances, but seldom have they addressed the simplest of questions, “why should we care?”

The purpose of this paper is to better understand the implications of the reversing wage gap between generations. In doing so, this paper performs an empirical tests for the importance of life satisfaction of an individual’s own income compared with the income of a reference group. To this end, three assumptions are made: (1) own income affects satisfaction with life, (2) parent income affects satisfaction with life, but to a lesser degree than own income (3) distance between own income and the income of a reference group matters. These assumptions form the basis of the following hypothesis: an adult that earns less in relation to his/her parents will be less satisfied with life, *ceteris paribus*. The expected sign designated in the hypothesis will be expanded on in section III. The assumptions and hypothesis will be tested through econometric regressions of individual self-reported satisfaction with life. The empirical analysis is based on a large U.S. data set, the 1997 National Longitudinal Survey of Youth (NLSY97). This paper contributes to the existing literature in a couple of ways. First, few studies prior have examined parent income as a reference point. Generally, studies focusing on the comparison income effect select the reference point as a group of peers in society. Selecting peer groups as the reference point captures a purely external comparison effect. Parents are also an external reference point, but the the way in which comparisons are made against them is likely to be more akin to internal

comparison. This will be expanded on further in section III. Second, the data set used here has a continuous measure of income. In past studies, often the income variable is only available in intervals and not on a continuous scale (for example, McBride, 2001).

## **II. Literature Review**

The recent surge in interest surrounding the economics of life satisfaction has resulted in much discussion about whether life satisfaction can even be accurately measured, i.e. do respondents provide a meaningful answer when asked to value on a finite scale their satisfaction with their own lives? Typically, economists interested in analyzing life satisfaction have used questions similar to the following:

*“All things considered, how satisfied are you with your life as a whole these days? Please give me an answer from 1 to 10, where 1 means extremely dissatisfied and 10 means extremely satisfied”*

The existing empirical evidence supports that individuals have a very similar understanding of concepts such as life satisfaction. For example, individuals are quite good at predicting other individuals' happiness (or emotions) by looking at pictures and videos (Diener and Lucas, 1999). On a related issue, Van Praag (1991) found evidence that individuals belonging to the same language community translate verbal labels in a context-free framework into similar numerical values. This indicates that not only is the meaning of “good” and “bad” the same for all respondents, but also the relationship between these verbal labels and a numerical scale (for example, 0 to 10) is judged in a similar way by respondents.

Recent years have produced numerous studies using answers to such questions, with the intent of testing the relative income hypothesis. The empirical specifications throughout these studies generally differ in a few key areas, including: 1) the choice of the income variable; 2) the

different specifications of relative income; 3) the choice of the reference group; 4) and the characteristics defining the reference group. For example, Ferrer-i-carbonell (2005) and Oshio et al (2011) used family and household income respectively as a form of relative income in place of individual income. In some studies relative income is a share of income over mean income (Duesenberry, 1949), while for others relative income is a distance of income from mean income (Ferrer-i-carbonell, 2005). Johansson-Stenman et al. (2002) compared the two types of formulations and found that the “ratio” approach performed slightly better than the “distance” approach. However, both approaches continue to be widely used in empirical research.

Also important is the choice of the reference group when defining relative income. Mean income is generally the variable that defines relative income, but the question is over what group this mean should be estimated. Verme (2010) refers to “alter comparisons” when people compare themselves with other people in society in the same point in time (cross-section comparisons) and “ego comparisons” when people compare themselves with their own past status or their own expected status in the future (self-comparisons). Basically, there are at least five types of reference groups: Richer and poorer individuals in the present (upward and downward comparisons), past and future own status (past and future self comparisons) and comparisons with peers (parallel comparisons). For instance, McBride (2001) sets the “external reference” point where people compare themselves with others. His findings suggest suggest that subjective well-being depends on relative income, but also that relative-income effects may be smaller at low income levels. Similarly, Luttmer (2005) and Ferrer-i-Carbonell (2005) refer to parallel and longitudinal comparisons. Both of whom find that higher earnings of peer groups are associated with lower levels of self-reported happiness.

The empirical literature has also explored which characteristics to use to best define a reference group. These different characteristics may be based on personal characteristics such as age and education or location characteristics such as region or town. For example, McBride (2001) used all people in the same country as a reference group, whereas Ferrer-i-Carbonell (2005) differentiates between east and west Germans.

### **III. Theory**

Economists typically adopt the view that well-being depends on actual life circumstances, and that one can safely infer well-being simply from observing these circumstances. The influence of this view is apparent even in the growing literature on the economics of happiness where, despite frequent acknowledgment of subjective factors, many studies consist mainly of regressing happiness on an array of objective variables – income, work status, and the like (Clark, Frijters, and Shields 2006, DiTella and MacCulloch 2006). Economic models focusing on the objective conditions of happiness, are sometimes formalized as,

$$U_i = U(u_1(Y_i), u_2(Y_i / Y_i^*), u_3(Z_i))$$

where the utility  $U_i$  (approximated by reported life satisfaction) of an individual  $i$  is the result of three sub-utility functions containing absolute income  $Y_i$ , relative income  $Y_i / Y_i^*$  (with  $Y_i^*$  as average income of the reference group) and other socio-economic and demographic variables as  $Z_i$  (Clark et al., 2008).

In contrast to economists' focus on objective conditions, Campbell proposed a framework in which objective conditions were replaced by reports on the satisfaction people expressed with those conditions (1976, 1981). This approach is generally referred to as multiple discrepancy theory (Diener et al 1999b; Solberg et al 2002). In this framework, overall satisfaction with life is

seen as the net outcome of reported satisfaction with major domains of life such as financial situation, family life, and so on. Satisfaction in each domain is, in turn, viewed as reflecting the extent to which objective outcomes in that domain match the respondent's goals. For example, if it's the goal of a man to have an income of \$100,000, but he only makes \$50,000, the discrepancy between the goal and actual circumstance will cause him to be less satisfied in the financial domain.

Generally, studies working under the framework of discrepancy theory use four domains-  
-finances, family circumstances, health, and work. Formally, this can be written as,

$$\text{Life Satisfaction} = D(\text{Satfin}, \text{Satfam}, \text{Satjob}, \text{Sathealth}).$$

The question then, as it pertains to multiple discrepancy theory, is how do individuals set their goals? McBride (2001) describes something he calls "norms". Norms may be thought of as the aspirations shaped by personal experience and social comparisons. This idea as it pertains to discrepancy theory implies that individuals use their status in the past to set expectations for themselves in the future. Individuals that then fall short of these expectations, are likely to be less satisfied with life when compared to those that have met their own expectations. From this, the following hypothesis can be derived: an adult that earns less in relation to his/her parents will be less satisfied with life, *ceteris paribus*.

#### **IV. Data**

The 1997 national longitudinal survey of youth (nlsy) data is used to test for the presence of relative-income effects. The NLSY is an annual survey of US households conducted by the Bureau of Labor Statistics. The survey is conducted by personal interview of the respondents. These data and information about the survey are publicly available from the NLSY web-site on

the Internet. The NLSY survey was chosen because it is publicly available and has life satisfaction and other measures that can be used to test for relative-income effects. There were nearly 9000 observations in the survey, but certain variables had large quantities of invalid skips. This tends to mean that the surveyor did not ask the respondent the question. For the purpose of this research, it has been assumed that the invalid skips were random, and that the population underlying the invalid skips is representative of the population used for analysis. Of the 9000 starting observations, 4617 life satisfaction observations made it through, along with 4622 observations for each of the independent variables. For the measure of SWB, the respondent was asked about satisfaction with his or her life in general. They answered by using a scale, in which 1 means totally satisfied, and 10 means totally unsatisfied. Since this measure is discrete, I will use discrete dependent variable methods of estimation.

The income of the respondent has been set to gross family income for the year 2008. Past literature has shown that own income has a small, but still important effect in determining satisfaction with life. Intuitively, one can determine that own income should positively affect life satisfaction, i.e. higher income will result in more satisfaction with life. Indeed, this expectation is in agreement with most previous literature (for example, Ferrer-i-Carbonell, 2005; McBride, 2001; Tsui, 2014).

For the reference income, gross *household* income of the parent from the year 1997 is used. It should be noted that this differs from the choice of respondent income, which is gross *family* income. This discrepancy arose due to the changing of the wording for the question in 2007 (which corresponds to round 11). This problem could have been circumvented by using questions from round 11, however, the question used to measure life satisfaction has only been asked one time, in round 12.

Variables for other individual characteristics include age, and dummies for gender, race, marriage, and health. The gender dummy takes on the value one if the respondent is female. The ethnicity dummy variable takes on 4 values, which include: black, hispanic, mixed-race, and non-black. The non-black response is left out. The marriage dummy variable takes on 4 values, these include: married, divorced, never married, and separated. The never married response is left out. The health variable is a subjective response that takes on five values, ranging from poor to excellent health. The response centered between the range of excellent to poor is “good”, this response is left out.

Life satisfaction follows a U-shape relationship with age, with a minimum satisfaction level at about 40 years old. It seems as if many individuals start their adult life with high expectations that are difficult to meet and thus get unhappier as time passes up until around their midlife, when they seem to revise their expectations downwards. For econometric specifications, the shape of the relationship between age and life satisfaction often results in a nonlinear transformation of the the age variable. However, the range of ages in my data set is very small (a maximum difference of 3 years). Thus, transforming the age variable in this instance would not more accurately reflect the relationship. The respondents tend to be in their mid to late twenties, meaning that the typical respondent should be expected to experience decreased life satisfaction with age.

Women are more frequently depressed than men, they are not consistently unhappier because they also experience more positive emotions (Diener et al., 1999). Of course, it’s still open to debate whether questions on happiness and total life satisfaction are equatable. It can be argued that happiness refers to day to day movements in one's outlook or mood, whereas total life satisfaction considers one’s experiences with life as a whole. If the day to day movements in

one's happiness make up total life satisfaction, then Diener's findings suggest that there should be no discrepancy between male or female respondents. However, past research has shown that while gender differences are, in general, not that large, they still exist. Ferreri-i-Carbonell (2005) and Tsui (2014) show that women tend to be more satisfied with life than men. I expect similar results.

For the ethnicity variables, the non-black/non-hispanic response was left out, and is what the other groups (black, hispanic and mixed-race) will be compared against. Previous studies that have controlled for race have typically only compared black to non-black respondents. Non-black ethnic groups are generally found to be slightly more satisfied with life. I expect similar results, whereby both non-black/non-hispanic, and hispanic respondents will tend to be more satisfied with life. Mixed-race could be expected to be either negative or positive.

Ideally, reported satisfaction with home life would be used instead of marriage status. Regardless, no such question appears in the NLSY97, and marriage status is often regarded by economists as a relevant determinant of happiness. For instance, having a partner with whom to share daily life contributes positively to life satisfaction (Clark and Oswald, 1994). In addition, evidence on the relationship between marital status and life satisfaction indicates that having a partner increases individual happiness, rather than being happy improving the probability of finding a partner (Stutzer and Frey, 2006). As such, I expect that married individuals will be happier than those who haven't married. Most economists only test for differences between married and unmarried respondents, so few studies have examined the relationship between separated and unmarried respondents. However, one can expect those who are separated from their partner will tend to be less satisfied with life than those who are unmarried.

Health is agreed to be an important determinant of happiness by both psychologists and

economists. Ideally, the question for health would be framed to question the respondent's satisfaction with own health, rather than the solely objective health status. But, I suspect there is little discrepancy between two. That is to say, it is unlikely those in good health would prefer to be in poor health. As such, I expect the respondent to be less satisfied with life the worse he or she ranks health status. The middlemost health response, "good", is what the other responses will be compared against. This means that the responses that identify an individual as having a better than "good" health status should be positive, and responses that rank below "good" should be negative.

Job satisfaction and financial satisfaction, domains that are usually included in otherwise similar studies, have been excluded. This will be expanded on further in the econometrics section (V).

## V. Econometrics Model

An econometric model generated solely from multiple discrepancy theory would take a form similar to the following,

$$U_i = \alpha + \beta_1 (J_i) + \beta_2 (F_i) + \beta_3 (M_i) + \beta_4 (H_i) + Z_i \gamma + \eta$$

where total life satisfaction (U) of an individual (i) is the result job satisfaction (J), financial satisfaction (F), family satisfaction (M), and health satisfaction (H). Z captures socio-economic and demographic variables. This paper does not use a replica of the above specification. Rather, discrepancy theory (and its resulting econometric specification) is used as the groundwork for the following model,

$$U_i = \alpha + \beta_1 \ln(y_i) + \beta_2 (\ln y_i - \ln y_i^*) + \beta_3 (M_i) + \beta_4 (H_i) + Z_i \gamma + \eta$$

where income  $Y_i$  and comparison income  $Y_i / Y_i^*$  are expressed in logarithmic terms to obtain a

linear relation. The beta coefficients, as well as the the coefficient vector  $\gamma$  then give information about the relation between each variable and utility.

The exclusion of the job and financial satisfaction domains may seem disconcerting at first, but consider two reasons. First, with no market failures, preferences over job amenities would be internalized in the labor market through wages (compensating wage differentials) and one would then not find any separate effect of, say, commuting time on life satisfaction after controlling for income. Second, the purpose of this paper is to better understand the implications of the reversing wage gap between generations. To do so, objective measures of income must be used. Consider this, if individuals derive happiness depending on how well they perform as compared to others, equally distributed income increases would not lead to substantial happiness changes (i.e. job and financial satisfaction would be unaffected). If individuals derive happiness depending on how well they perform as compared to others, and income increases for a specific demographic (generation y experiences a wage increase, but generation z does not), then the implications become much more nuanced. A variable in which the respondents identified their general satisfaction with their job or finances would not lend as much insight into what may be causing differences across individuals

## **VI. Results**

Three separate specifications were run using a probit regression in order to test the three expectations: (1) own income positively affects satisfaction with life, (2) parent income affects satisfaction with life, but to a lesser degree than own income (3) distance between own income and the income of a reference group matters. Appendix B presents the results for three different specifications of the model. The first row is the simplest specification, in which besides the control variables, only family income is included. The second row presents the results for the

second specification, which includes family income and parent income. Row 3 presents a specification in which family income remains, but parent income is dropped, and replaced with comparison income ( $\ln\text{FamilyIncome} - \ln\text{ParentIncome}$ ).

For ease of analysis regarding these specifications the dependent variable was collapsed into a binary dummy variable. The collapsing point of the dummy variable was done somewhat arbitrarily, as it is simply the mean point of the variable. As such, one cannot say that those who identified as being below 8 on the life satisfaction scale are unsatisfied, and that those who rank at 8 or above are suddenly satisfied. As such, I will refer to the 0 value (those who ranked within 1-7) as less satisfied, and the 1 value (those who ranked within 8-10) as more satisfied. This of course assumes ordinality, and that all respondents mean about the same when reporting their satisfaction level, i.e. individuals reporting an 8 feel more satisfied with their life than those reporting a 7.

It should be noted that because a probit model was used, the table reports the average marginal effects of a variable on the probability that an individual will identify as being more satisfied with life. SAS uses derivative calculation, meaning that the marginal effect results for dummy variables could potentially be unreliable. Often, the marginal effects for the dummy variables are calculated by taking the difference of estimated probabilities between the different levels of dummy covariates ( $\text{Satisfaction}=1$  and  $\text{Satisfaction}=0$ ). However, due to time constraints, and consideration that the dummy variables are not the variables of interest for this study, the proper process for evaluating the marginal effects for dummy variables was performed only not performed. As such, the reported marginal effects for the dummy variables should be taken with caution.

The first specification includes the income of the respondent (family income), but does

not include parent income or comparison income. From the table, the results show that a 1% increase in own income will increase the the probability of being *more satisfied with life* by 2.5%. This result holds the first assumption and expectation that own income positively affects satisfaction with life.

The second specification keeps income of the respondent, and adds parent income of the respondent. It was expected that parent income affects satisfaction with life, but that the magnitude of the impact would be smaller than that of respondent's own income. The results of the second specification are consistent with the expectation. A 1% increase in parent income increases the probability that the respondent will identify as being *more satisfied with life* by about .5%. However, the result for parent income is not statistically significant. Income of the respondent remained significant, and its magnitude dropped very slightly.

The third specification drops parent income from the analysis, and adds distance between own income and the income of a reference group. The hypothesis of this paper was that an adult that earns less in relation to his/her parents will be less satisfied with life, *ceteris paribus*. The results of the third specification do not support the hypothesis. The coefficient of the distance between incomes is negative, indicating that the larger an individual's own income is in comparison to the reference group income, the the more likely that individual is to be *less satisfied with life*. Specifically, a 1% rise in own income, as it relates to parent income, decreases the probability that an individual will be more satisfied with life by about .5%. Additionally, the coefficient of the difference between an individual's own income and reference group's income is not statistically significant.

The marginal effects for the dummy variables changed only very slightly across specifications. Due to this, interpretation of them will be done only once, and it will correspond

to the third specification, as it is the specification in which the main variable of interest for study is included. Females are more almost 5% more likely to identify as being *more satisfied with life* than males. This is unsurprising as it is consistent with the previous literature. Looking at the ethnicity variables, the results tend to agree with the previous literature, non-blacks tend to be more satisfied than blacks. The health variables indicate that those who identify as having better than “good” health are more likely to be satisfied with life. Those who identified as having worse than poor health are less likely to be satisfied with life. Additionally, the most significant effects for the health variables (in terms of magnitude) take place on either of the extremes (“excellent” health and “poor” health), as one would expect. The variables for marital status present no surprises. Married individuals are more likely to be *more satisfied with life* than unmarried individuals. Additionally, respondents that were separated from their partner at the time of the study were 20% less likely to be *more satisfied with life* when compared against unmarried individuals.

In addition to the three models ran through probit, also included is an ordered probit regression. The specification of the ordered probit is the same as the third specification for the normal probit, except that the dependent variable has been uncollapsed. The scale now represents the full range of answers (1-10). This is beneficial because larger scales allow for more precise measurements of reported satisfaction with life. Appendix C includes the results of the ordered probit regression. The table does not include the marginal effect estimates for the variables that were not the main point of interest for this study. It includes the average marginal effects of own income, and distance between own income and parent income. Also included are the underlying parameter estimates for the aforementioned variables. The distance between respondent income and parent income shows a positive parameter estimate. This is in contrast with the previous

probit run that indicated the comparison income effect to be positive. This new result, using a more precise dummy variables, partially supports the hypothesis, in which it was expected the comparison income effect between respondent and parent to be negative, indicating that the smaller an individual's own income is in comparison to the reference group income, the less satisfied with life he/she is. However, neither the income of the respondent, nor the comparison effect are statistically significant. Despite the statistical insignificance, the marginal effects of the ordered probit are still interesting. The average marginal effects of the comparison income variable, and the respondent income variable tend to move together. That is to say, that the sign values on each variable mirror one another. These results suggest that the both comparison income and own income effect the probability of moving from one satisfaction level to another in a very similar way, i.e. the comparison income effect tends to be smaller than the effect of own income, but the direction of the effect is shared between them across every life satisfaction level. The marginal effects for the income variables as a whole show that as own income increases, there may be a two effects occurring that are relevant to satisfaction with life. An increase in own income increases the probability of identifying as being satisfied with life, and as income increases relative to parent income, the probability of being more satisfied with life increases.

## **VII. Conclusion and Limitations**

This paper presented an empirical tests about the importance of income and comparison income for individual well-being. The empirical analysis has taken the responses to a life satisfaction question as a measure of individual satisfaction with life. The data used was from the National Longitudinal Survey of Youth 1997. The following results came from this study: (1) own income affects satisfaction with life. (2) Parent income affects satisfaction with life to a

lesser degree than absolute income, but it is not statistically significant. (3) The distance between own income and parent income is statistically insignificant in both probit and ordered probit regressions. These results have not proven that an adult that earns less in relation to his/her parents will be less satisfied with life. However, statistical insignificance does not necessarily mean that the hypothesis is incorrect, there could be a variety of limitations contributing to the lack of significance.

One limitation is that this study does not correct for individual time persistent traits. This was due to the NLSY97 not being panel data. It's likely that subjective questions, such as asking someone to evaluate their own satisfaction with life subjective, depend on individual unobservable time persistent traits, such as intelligence, neuroticism, and optimism. The inclusion of such individual effects may have a large impact on the results. As a partial correction for this, the inclusion of a psychological variable may have been warranted. However, such a variable falls outside of the confines of the theoretical model, and few relevant questions exploring the psychology of the individual exist on the NLSY97.

Another limitation is that there was a large number of invalid skip responses for the questions relating to income. For the purposes of this study, it was assumed that the sample of skipped responses was random, and representative of the entire sample. However, it is possible that some of the skips were non-random. Non-random missing observations can skew the data, and produce results that are not representative of a random population.

## VIII. Appendix A

*Variable Descriptions, all data is taken from the National Longitudinal Survey of Youth, 1997*

<b>Variable</b>	<b>Description</b>	<b>Source</b>
<b><i>Gross Household Income (Parent)</i></b>	Parent's household income, 1997	Parent questionnaire, round 1
<b><i>Gross Family Income (Respondent)</i></b>	R's family income, 2008	Round 12
<b><i>Sense of Well-Being</i></b>	How satisfied R is with life (10-point scale from extremely dissatisfied to extremely satisfied)	Round 12
<b><i>Age</i></b>	Age of respondent	Round 12
<b><i>Marital Status</i></b>	Status of respondent (married, divorced, never married, separated )	Round 12
<b><i>Gender</i></b>	Gender of respondent	
<b><i>Health Status</i></b>	How R views his current health (5-point scale from excellent to poor)	Round 12
<b><i>Ethnicity</i></b>	black, hispanic, mixed-race, non-black	

### *Descriptive Statistics*

<b><i>Variable</i></b>	<b><i>N</i></b>	<b><i>Mean</i></b>	<b><i>Std. Dev.</i></b>	<b><i>Minimum</i></b>	<b><i>Maximum</i></b>
<b><i>Life Satisfaction</i></b>	4617	7.6759801	1.7531394	1.00	10.00
<b><i>Family Income</i></b>	4622	61400.42	57585.22	27.0000000	313703.00
<b><i>Parent Income</i></b>	4622	63419.17	56029.39	6.7072586	330632.97
<b><i>Age</i></b>	4622	25.9350930	1.3912678	24.0000000	28.0000000
<b><i>Gender</i></b>	4622	0.4980528	0.5000503	0	1.0000000
<b><i>Ethnicity</i></b>	4622	1.8790567	1.3041469	0	3.0000000
<b><i>Health</i></b>	4622	1.2191692	0.9379103	0	4.0000000
<b><i>Marriage Status</i></b>	4622	0.4423244	0.7174829	0	3.0000000

## Appendix B

*Average marginal effects of probit*

	<i>Pr(SWB=1)</i>	<i>Pr(SWB=1)</i>	<i>Pr(SWB=1)</i>
<i>(Infamily-Inparent)</i>	-	-	-0.0046
<i>(Inparent)</i>	-	0.0046	-
<i>ln(Family income)</i>	0.0253***	0.0244***	0.0290**
<i>Age</i>	-0.0042	-0.0043	-0.0047
<i>Female</i>	0.04703***	0.0471***	0.0471***
<i>Black</i>	-0.0400**	-0.0373**	-0.0369**
<i>Hispanic</i>	0.0573***	0.0610***	0.0631***
<i>Mixed Race</i>	-0.0825	-0.0824	-0.0820
<i>Health is Excellent</i>	0.2186***	0.2179***	0.2175***
<i>Health is very good</i>	0.0995***	0.0988***	0.0987***
<i>Health is fair</i>	-0.1371***	-0.1371***	-0.1370***
<i>Health is poor</i>	-0.3483***	-0.3481***	-0.3485***
<i>Married</i>	0.1573***	0.1573***	0.1575***
<i>Separated</i>	-0.1964**	-0.1959**	-0.1957**
<i>Divorced</i>	0.006	0.007	0.007

*Note: \*, \*\*, \*\*\*=significance at the 1%, 5%, and 10% levels*

*Average Marginal Effects of Ordered Probit*

<i>Life Satisfaction</i>	<i>(lnfamily-lnparent)</i>	<i>Ln(family income)</i>
<i>Paramater Estimate</i>	0.013841	0.029681
<i>Pr(SWB=1)</i>	-0.000276749	-0.000593319
<i>Pr(SWB=2)</i>	-0.000101703	-0.000218058
<i>Pr(SWB=3)</i>	-0.000379260	-0.000813193
<i>Pr(SWB=4)</i>	-0.000432589	-0.000927589
<i>Pr(SWB=5)</i>	-0.0014458	-0.0031003
<i>Pr(SWB=6)</i>	-0.000955716	-0.0020496
<i>Pr(SWB=7)</i>	-0.0013706	-0.0029395
<i>Pr(SWB=8)</i>	0.000362813	0.000777756
<i>Pr(SWB=9)</i>	0.0014348	0.0030769
<i>Pr(SWB=10)</i>	0.0031647	0.0067869

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## SAS Code

```
Libname evan 'C:\Users\emk48\Dropbox\Evan_Kennedy';

DATA one;
/* R0536300=gender, R0536402=birthdate, R1482600=race,
T3003000=Respondent_income, R1204500=parent income, T3162400=happiness; */

    SET evan.new_data;

/* SCM nonint 2008 */

nonint2008=0;          /* SCM added */
if T2016200=.N then nonint2008=1; /* SCM added */

***Collapsed Happiness***;
if T3162400 >= 8 then happiness=1; /* SCM */
else happiness=0;

***RACE***;
race=R1482600-1;

if race=0 then do; race_1=0; race_2=0; race_3=0; end;
if race=1 then do; race_1=1; race_2=0; race_3=0; end;
if race=2 then do; race_1=0; race_2=1; race_3=0; end;
if race=3 then do; race_1=0; race_2=0; race_3=1; end;

black=0;
hispanic=0;
mixed_race=0;
white=0;

if R1482600=1 then black=1;
if R1482600=2 then hispanic=1;
if R1482600=3 then mixed_race=1;
if R1482600=4 then white=1;

***GENDER***;
female=R0536300-1;
if female < 0 then /* SCM remove delete; there are zero missing values */
female=.;

***AGE***;
age=2008-R0536402; /* SCM you have birth month and birth year, why not use
both */

***Health***;
health=T3144600-1; /* warning from SAS LOG that missing values generated */

if health=0 then do; health_1=0; health_2=0; health_3=0; health_4=0; end;
if health=1 then do; health_1=1; health_2=0; health_3=0; health_4=0; end;
if health=2 then do; health_1=0; health_2=1; health_3=0; health_4=0; end;
if health=3 then do; health_1=0; health_2=0; health_3=1; health_4=0; end;
if health=4 then do; health_1=0; health_2=0; health_3=0; health_4=1; end;
```

```

Excellent=.;
very_good=.;
good=.;
fair=.;
poor=.;

if T3144600 >=1 then do;
    Excellent=0;
    very_good=0;
    good=0;
    fair=0;
    poor=0;
    end;
    if T3144600=1 then excellent=1;
    if T3144600=2 then very_good=1;
    if T3144600=3 then good=1;
    if T3144600=4 then fair=1;
    if T3144600=5 then poor=1;

***Marital Status***;
***response starts at 0***;
marstat=T2020400;

if marstat=0 then do; marstat_1=0; marstat_2=0; marstat_3=0; marstat_4=0;
end;
if marstat=1 then do; marstat_1=1; marstat_2=0; marstat_3=0; marstat_4=0;
end;
if marstat=2 then do; marstat_1=0; marstat_2=1; marstat_3=0; marstat_4=0;
end;
if marstat=3 then do; marstat_1=0; marstat_2=0; marstat_3=1; marstat_4=0;
end;
if marstat=4 then delete; /* SCM left as is since it deletes widowed and n=5
*/

Never_married=.;
married=.;
separated=.;
divorced=.;
widowed=.;

if T2020400 >=0 then do;
    Never_married=0;
    married=0;
    separated=0;
    divorced=0;
    widowed=0;
    end;
    if T2020400=0 then Never_married=1;
    if T2020400=1 then married=1;
    if T2020400=2 then separated=1;
    if T2020400=3 then divorced=1;
    if T2020400=4 then widowed=1;

***Income****;
parent=R1204500; /* 1997 SCM 167 is zero and 211 is over 200000 */
FamIncome=T2016200; /* 2008 SCM 100 is zero and 133 is over 200000 */
/* SCM replace
if parent > 200000 then delete;
if famincome > 200000 then delete;

if R1204500 < 1 then delete; else FamIncome=T2016200;
if T2016200 < 1 then delete; else parent=R1204500;
*/
if R1204500 < 1 then delete;
if T2016200 < 1 then delete;

```

```

if R1204500 = 0 then R1204500=1;
if T2016200 = 0 then T2016200=1;

/* recode 1997 income into 2008 values using CPI97=160.5 and CPI2008=215.303
*/
parent=parent/(160.5/215.303);

lnFamincome=log(famincome);
lnParent=log(parent);

key=lnfamincome-lnparent;

label marstat_1=married;
label marstat_2=separated;
label marstat_3=divorced;
label race_1=hispanic;
label race_2=mixed race;
label race_3=non-black;
label health_1=very good;
label health_2=good;
label health_3=fair;
label health_4=poor;
label lnfamincome=family income, 2008;
label lnparent=parent income, 1997;
label key=comparison income;
label parent=parent income;
label famincome=family income;
label marstat=marriage status;
label health=health status;

/*scm added from here */
ods pdf file='C:\Users\myers\Dropbox\Evan_Kennedy\one_correlations.pdf';
options orientation=portrait center;
proc corr data=one;
run;
ods pdf close;
/* SCM to here */

/* set permanent data set
Data evan.one;
    set work.one;
    run;

end of writing new data set */

Libname evan 'C:\Users\emk48\Dropbox\Evan_Kennedy';
***MODEL***;
ods pdf file='C:\Users\emk48\Dropbox\Evan_Kennedy\project_results.pdf';
options orientation=portrait center;

```

```
%let x=age female black hispanic mixed_race excellent very_good fair poor
married separated divorced;
```

```
proc qlim data=evan.one;
```

```
model_1: model happiness = lnfamincome &X / discrete(d=probit);
output out=outme1 marginal;
run;
```

```
proc qlim data=evan.one;
```

```
model_2: model happiness = lnfamincome lnparent &X /
discrete(d=probit);
output out=outme2 marginal;
run;
```

```
proc qlim data=evan.one;
```

```
model_3: model happiness = lnfamincome key &X /
discrete(d=probit);
output out=outme3 marginal;
run;
```

```
/* alternatives */
```

```
proc qlim data=evan.one;
```

```
model_1: model T3162400 = lnfamincome &X / discrete;
output out=outme4 marginal;
run;
```

```
proc qlim data=evan.one;
```

```
model_2: model T3162400 = lnfamincome lnparent &X / discrete;
output out=outme5 marginal;
run;
```

```
proc qlim data=evan.one;
```

```
model_3: model T3162400 = lnfamincome key &X / discrete;
output out=outme6 marginal;
run;
```

```
ods pdf close;
```

```
/****** stop *****/
```

```
data me_diff;
```

```
input key lnfamincome age female black hispanic mixed_race excellent
very_good fair poor married separated divorced happiness;
```

```
datalines;
```

```
-.05 10.53 26 1 .24 .19 .009 .25 .37 .078 .008 .3 .007 .04 .
-.05 10.53 26 0 .24 .19 .009 .25 .37 .078 .008 .3 .007 .04 .
```

```
-.05 10.53 26 .5 1 0 0 .25 .37 .078 .008 .3 .007 .04 .
```

```
-.05 10.53 26 .5 0 .19 .009 .25 .37 .078 .008 .3 .007 .04 .
```

```
-.05 10.53 26 .5 0 1 0 .25 .37 .078 .008 .3 .007 .04 .
```

```
-.05 10.53 26 .5 .24 0 .009 .25 .37 .078 .008 .3 .007 .04 .
```

```
-.05 10.53 26 .5 0 0 1 .25 .37 .078 .008 .3 .007 .04 .
```

```
-.05 10.53 26 .5 .24 .19 0 .25 .37 .078 .008 .3 .007 .04 .
```

```

-.05 10.53 26 .5 .24 .19 .009 1 0 0 0 .3 .007 .04 .
-.05 10.53 26 .5 .24 .19 .009 0 .37 .078 .008 .3 .007 .04 .

-.05 10.53 26 .5 .24 .19 .009 0 1 0 0 .3 .007 .04 .
-.05 10.53 26 .5 .24 .19 .009 .25 0 .078 .008 .3 .007 .04 .

-.05 10.53 26 .5 .24 .19 .009 0 0 1 0 .3 .007 .04 .
-.05 10.53 26 .5 .24 .19 .009 .25 .37 0 .008 .3 .007 .04 .

-.05 10.53 26 .5 .24 .19 .009 0 0 0 1 .3 .007 .04 .
-.05 10.53 26 .5 .24 .19 .009 .25 .37 .078 0 .3 .007 .04 .

-.05 10.53 26 .5 .24 .19 .009 .25 .37 .078 .008 1 0 0 .
-.05 10.53 26 .5 .24 .19 .009 .25 .37 .078 .008 0 .007 .04 .

-.05 10.53 26 .5 .24 .19 .009 .25 .37 .078 .008 0 1 0 .
-.05 10.53 26 .5 .24 .19 .009 .25 .37 .078 .008 .3 0 .04 .

-.05 10.53 26 .5 .24 .19 .009 .25 .37 .078 .008 0 0 1 .
-.05 10.53 26 .5 .24 .19 .009 .25 .37 .078 .008 .3 .007 0 .
;
run;

data me_diff;
  set evan.one me_diff;
run;
proc qlim data=me_diff;
  model happiness = key lnfamincome age female black hispanic mixed_race
  excellent very_good fair poor married separated divorced/discrete;
  output out=outme7 marginal;
run;

proc print data=outme7 (firstobs=4623);
var meff_p1_black Meff_P2_black race_1 Prob1_happiness Prob2_happiness
happiness;
run;

```