

An Analysis of Subjective Well-Being in Ireland

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1. Introduction

This paper investigates the impact of health status on the subjective well-being of individuals in Ireland using data from the European Social Survey 2002-2007. Subjective well-being is taken as a measure of experienced utility and this paper estimates a utility maximising model whereby individuals are assumed to want to maximise their utility or well-being. By estimating three ordered probit models, one for each round of the European Social Survey, this paper also identifies the relationship, in terms of statistical significance, between well-being and a host of other personal and socio-economic variables including; age, gender, income, marital status, employment status, level of education, area of residence, church attendance and levels of trust in other people.

This paper adopts the utility maximising model of subjective well-being and identifies the model's relevance within economic research on well-being. Since the writings of Bentham, in the sixteenth and seventeenth centuries, a number of studies have been undertaken by economists in the area of subjective well-being (Easterlin, 1974; Freeman, 1978; Clark and Oswald, 1994; Di Tella, MacCulloch and Oswald, 2001; Frey and Stutzer, 2002a) and these studies have referred to utility as a measure of well-being, happiness or pleasure. Life satisfaction data has also been used in a number of economic studies as an indicator of subjective well-being and as a proxy for utility (Helliwell, 2003). This paper estimates three ordered probit equations to analyse the effect of health status and other explanatory variables on life satisfaction. The empirical analysis is based on a European dataset, the European Social Survey. The European Social Survey has been conducted in three rounds to date; 2002-2003, 2004-2005 and 2006-2007 and this paper, for the first time, utilises all three rounds in an analysis of subjective well-being in Ireland.

It is proposed that the results from the analysis of subjective well-being in Ireland in this paper can be used by the Irish Government and further integrated into public policy to enhance the health and well-being of individuals in Ireland. In particular this paper highlights the link between life dissatisfaction and suicide and presents some findings for the Irish Government with respect to suicide. The rationale for this paper is outlined in more detail in Section 2.

1.1 Definitions of Subjective Well-Being, Life Satisfaction and Happiness

For many years, because of its cognitive and emotional nature, research on the issue of individual well-being was mainly undertaken by psychologists and reported mainly in psychological literature (Argyle, 1987; Diener *et al*, 1999; Diener, 2000; Brickman, Coates and Janoff-Bulman, 1978). As a result, the meanings for the terms 'subjective well-being', 'life satisfaction' and 'happiness' are

primarily rooted in psychological terminology. These terms are used throughout this paper and are discussed below.

Subjective Well-Being (Well-Being)

Subjective-well being refers to the various evaluations that individuals make in relation to their lives. These evaluations can be either positive or negative. According to Diener (2006) subjective well-being incorporates different aspects of an individual's life such as; life satisfaction, work satisfaction, emotional responses such as joy (happiness) or sadness, events that occur in one's life and the circumstances in which one lives. A number of authors describe the term subjective well-being as an 'umbrella term' for words such as happiness, life satisfaction and well-being. According to Graham *et al* (2004) psychologists tend to make a distinction between happiness and life satisfaction whereas economists seem to use words such as happiness, life satisfaction and well-being interchangeably in their work.

According to Frey and Stutzer (2002a) subjective well-being is the scientific term in psychology for an individual's evaluation of his/her experienced positive and negative affect, happiness, or life satisfaction. Subjective well-being can also be used to describe not only how people feel about their lives at the present moment but also how they feel about their lives in the past. Individual well-being is not an isolated feeling but rather a collection of feelings which are determined by the conditions in which a person lives. As a result, an economic evaluation of well-being can be estimated by taking into account different characteristics of people's lives.

Survey questions on life satisfaction and happiness are therefore good measures of individual's well-being. Certain economists and psychologists believe that measures of subjective well-being should be used to form the basis of Government policy (Diener, 2000). Furthermore, subjective well-being measures are necessary to evaluate a society, and can add substantially to the economic indicators that are now favoured by policy makers, according to Diener & Suh (1997).

Life Satisfaction

The term life satisfaction draws its meaning from an abundance of psychological literature on the issue of subjective well-being. The term 'life satisfaction' represents a report of how an individual appraises or evaluates his or her life *taken as a whole* (Diener, 2006). It is intended to signify a broad, reflective appraisal that an individual makes of their life.

Happiness

Happiness has several meanings according to Diener (2006). It can be taken to mean a generally positive mood, a global evaluation of one's life, living a good life or the causes that make people happy. Happiness studies regularly focus on positive and negative affect, emotions, moods and pleasant and negative experiences (Diener, Sandvik and Pavot, 1991). Happiness measures can, therefore, be influenced by mood at the time of responding to a questionnaire.

The use of Life Satisfaction Data versus Happiness Data

Previous research has used the term 'happiness' to describe brief periods of joy or acute happiness. Helliwell and Putnam (2004) state that self assessed ratings of happiness tend to reflect relatively short-term expressions of mood that are dependent on the situation the individual is in at the time. They also note that life satisfaction ratings tend to produce more long-term, stable evaluations of an individual's overall well-being. Frey and Stutzer (2002b) describe happiness as an '*elusive concept*', and because of this they do not try to define the term. Diener (2006) states that due to the fact that there are so many different meanings for the word 'happiness' that some researchers avoid using the term altogether. Johns and Ormerod (2007) agree that the question of what constitutes happiness is a profound one and they believe that defining happiness is a problem that has occupied some of the greatest minds in the Western world and yet still remains open (Johns and Ormerod, 2007). Therefore, life satisfaction data is utilised in this study as a measure of subjective well-being.

2. Rationale

During the 1990's and early 2000's Ireland experienced the 'Celtic Tiger' era and economic prosperity flourished in the nation. However, in spite of this economic boom suicide rates in Ireland have generally been increasing since 1994. The issue of suicide in Ireland has, therefore, become a significant policy challenge for educationalists, health service executives and Government officials. In 2005, a document titled '**Reach Out – Irish National Strategy for Action on Suicide Prevention 2005-2014**' was produced by a collaboration of the Health Service Executive, the National Suicide Review Group and the Department of Health and Children. This Strategy was put together to address the problems of suicide and deliberate self-harm which are prevalent in Ireland today.

Between 2001 and 2006 there were, on average, 471 deaths by suicide in Ireland annually, peaking at 519 in 2001. The suicide rate among those in their 20s and early 30s is the highest, with men

under 25 years accounting for approximately 40% of all Irish suicides. Currently, the highest rate of suicide is found among young men in the age group 20-29 years (35 per 100,000). Ireland has experienced one of the fastest rising suicide rates in Europe having risen on average since 1994. The rise was largely confined to men and has been most striking in young men in the 20 to 30 years age group. While the overall female suicide rate has not increased since 1980, the rate of suicide in young women (15 to 24 years) more than doubled in the 1990s (Health Service Executive, 2006). According to the Health Service Executive (2006) the problem of suicide in Ireland has become a national epidemic with more people dying each year as a result of suicide than from road traffic accidents. For example, in 2006 the number of deaths by suicide recorded was 409 and by motor vehicle accident was 285.

According to the World Health Organisation (2005) youth suicide rates in Ireland are the fifth highest in Europe at 15.7 per 100,000 for 15-24 year olds. Deliberate self-harm is also a significant problem among the youth in Ireland. According to the Irish National Parasuicide Registry, over 10,000 cases of deliberate self-harm were treated in the accident and emergency departments of Irish hospitals in 2005 and many more cases of deliberate self-harm go unreported and are never brought to the attention of the health services.

A study carried out by Koivumaa-Honkanen *et al* (2001) investigates life satisfaction and suicide in Finland. The results of the study indicate that there was a greater incidence of death by suicide among people who had described themselves as '*dissatisfied*' with life at the beginning of the 20 year study. The study concludes that life dissatisfaction has a long-term effect on the risk of suicide and that it appears to be a strong suicide predictor (Koivumaa-Honkanen *et al*, 2001). Therefore, this paper proposes that assessing individuals' dissatisfaction with life might be a way of identifying those at risk of suicide in Ireland. In order for the Irish Government to address the issue of suicide prevention they need to firstly ascertain the factors that affect subjective well-being in Ireland. Then the Government can set out to increase the well-being of the Irish population and in particular those who may be at higher risk of committing suicide. According to the study carried out by Koivumaa-Honkanen *et al* (2001), suicide prevention approaches need to pay attention to other risk factors or indicators for higher suicide risk. The results presented in this paper identify the determinants of Irish individuals' well-being and their underlying state of life satisfaction and dissatisfaction. It is proposed that the results of this research will highlight to the Irish Government those individuals who show signs of dissatisfaction with life and who may be more vulnerable and at risk of attempting suicide. Studies have also found that people who score

high on life satisfaction scales are less likely to attempt suicide (Moum, 1996) and to become depressed in the future (Lewinsohn, Redner, and Seeley, 1991).

A number of objectives and actions were outlined in ‘Reach Out – Irish National Strategy for **Action on Suicide Prevention** 2005-2014’ to tackle the problem of suicide in Ireland. These actions are currently being addressed by the various Irish agencies, such as the Health Service Executive, and groups, including the National Task Force on Suicide, to alleviate the problem of suicidal behaviour in Ireland over a 5 to 10 year period. One of the objectives in the Strategy is to ‘*Systematically plan research into suicidal behaviour to address deficits in our knowledge, ensure that the development of services is evidence-based and bridge the gap between research and practice*’ (Health Service Executive, 2006). To that end the Strategy sets out the following action to be taken; ‘*(to) agree a national programme and plan of research into deliberate self-harm, suicide and suicide prevention*’ (Health Service Executive, 2006). Therefore, it may be possible for the Irish Government and suicide prevention groups to use the results of an economic analysis of subjective well-being to form policies and action plans that would increase the well-being of individuals in Ireland who may be contemplating suicide. By decreasing life dissatisfaction among individuals and thereby increasing the overall well-being of the Irish society the Government may be able to reduce the incidence of suicide in Ireland.

3. Data Source and Empirical Techniques

In order to identify the determinants of subjective well-being of individuals in Ireland this paper uses three rounds of the European Social Survey as the primary data source. The European Social Survey (the ESS) is a biennial cross sectional survey covering over 30 nations and it monitors Europe’s changing social attitudes, social beliefs and values (European Social Survey, 2008). The survey is conducted by personal interview with the respondents. All data and information regarding the survey are publicly and freely available from the European Social Survey website on the Internet¹.

The European Social Survey aims:

- To measure and monitor changing social attitudes and values across Europe, identifying and interpreting trends over time, both within and between nations
- To improve the reliability of quantitative cross national measurement in Europe

¹ See the European Social Survey web site at www.europeansocialsurvey.org

- To help achieve the degree of recognition for social indicators and attitudinal measures that is currently awarded to economic indicators and attitudinal measures as appropriate criteria for judging and comparing the quality of life in different societies.

This paper used the first three rounds of the survey. The fieldwork for the first round of the European Social Survey was undertaken in 2002/2003. In Round One of the survey a total of twenty-two countries participated. This included all of the European Union member states. Round Two was carried out in 2004/2005 and the number of participating countries increased to twenty-six. Round Three was fielded in 2006/2007 and included data from twenty-five countries. Over the three consecutive rounds of the survey a total of seventeen countries participated in all three rounds. Ireland participated in all three rounds of the survey.

The European Social Survey questionnaire includes two main sections, each consisting of approximately 120 items; a 'core' module which is constant from round to round, plus two or more 'rotating' modules which are repeated at intervals. The core module aims to monitor a wide range of social variables; including social and public trust; political interest and participation; socio-political orientations, governance and efficacy; moral, political and social values; social exclusion, national, ethnic and religious allegiances; well-being, health and security; demographics and socio-economics (European Social Survey, 2008) The European Social Survey main questionnaire is made up of the core module and a rotating module which is different in all three rounds. The Round One (2002/2003) rotating modules included immigration and asylum issues and citizen involvement and democracy. The Round Two (2004/2005) rotating modules included health and care seeking, economic morality and family, work and well-being issues. The Round Three (2006/2007) rotating modules included perceptions of the life course and its timing and issues dealing with personal and social well-being.

According to the European Social Survey certain words such as 'democracy', 'social life' or 'unification' can mean different things to different people at different points in time and in different countries. To alleviate this problem the European Social Survey annotates its source questionnaire to try to ensure that a translation conveying the same meaning is used in all countries. The survey design includes strict quality controls such as random probability sampling, a minimum target response rate of 70% and rigorous translation protocols. As a result the quality of the dataset is very high.

In all three datasets from the European Social Survey a number of observations were omitted as they were unusable. Due to non-item response a number of observations were omitted. Following this clean up procedure the numbers left in each dataset were 1724 in Round 1, 2266 in Round 2 and 1264 in Round 3.

3.1 The Dependent Life Satisfaction Variable

In this paper the dependent variable life satisfaction (*STFLIFE*) is the response to the question “*All things considered, how satisfied are you with your life as a whole nowadays?*” which is included in all three rounds of the European Social Survey. Respondents are asked to rank their answer on an eleven-point scale ranging from 0 “*extremely dissatisfied*” to 10 “*extremely satisfied*”. As with other economic studies on well-being, it is assumed that the answers to the life satisfaction question are ordinally comparable and that it is unknown what the relative difference is between the satisfaction answers. However, it is assumed that all respondents have the same interpretation of the possible answers (Ferrer-i-Carbonell and Frijters, 2004). Ordinal variables do not establish the numeric difference between data points. They indicate only that one data point is ranked higher or lower than another (Runyon, 1991).

Reliability of Subjective Well-Being Data

A considerable body of research has shown that the use of subjective well-being data is reliable and valid. According to Kahneman and Krueger (2006) the validity of subjective measures of well-being can be assessed by considering the correlation between individual characteristics and reported life satisfaction or happiness. Global subjective well-being questions have been found to correlate well with a host of relevant measures (Kahneman and Krueger, 2006). Findings from psychologists have shown through observations on individuals that those who say that they are happy and very satisfied with life actually smile more, and are more likely to be described as happy by their friends. Measures of low levels of subjective well-being have been proven through considerable research to predict; length of life (Palmore, 1974), coronary heart disease (Sales and House, 1971), quitting a job (Freeman; 1978, Akerlof, Rose and Yellen; 1988, Clark; 2001), absenteeism (Clegg, 1983), non-productive work (Mangione and Quinn, 1975) and the duration of unemployment (Clark, 2003).

The overall conclusions made in the literature are that subjective well-being is a meaningful concept and subjective well-being measures, such as life satisfaction, are meaningful measures of the concept.

3.2 The Independent Variables

In addition to data on the dependent variable life satisfaction, the European Social Survey also includes a large number of socio-demographic characteristics, a number of which are used as explanatory variables in this paper.

Health Status

In the European Social Survey there are two health related questions which are incorporated into this analysis of well-being. Health status is measured by asking individual respondents to rate how they feel their health is in general. Respondents rated their health as ‘very good’, ‘good’, ‘fair’, ‘bad’ or ‘very bad’. The result is a self-assessed level of health status which is used to determine its effect on well-being. A further health-related question in the European Social Survey is:

“Are you hampered in your daily activities by any physical or mental health problem, illness or disability?”

Respondents are prompted to answer ‘yes, a lot’, ‘yes, to some extent’ or ‘no’. Three dummy variables were created to indicate the degree to which an individual is hampered or limited in carrying out daily activities by ill health. By using both of these variables the results give an overall assessment of how health status and illness affect the life satisfaction of individuals in Ireland.

Income

In the European Social Survey income bands are available for the household’s total net income. In Round One of the European Social Survey these bands range from under €6,900 net income per annum to €69,501 or higher net income per annum. For the purpose of econometric analysis in this paper these bands were converted into numerical values using the mid-point of each band (Layard *et al*, 2008). For respondents in the lowest income band an income of two thirds of the upper limit of the band was used and for respondents in the highest income band an income of 1.5 of the lower income limit of the band was assumed (Layard *et al*, 2008). In Round Two and Round Three the bands are slightly different to the bands in Round One and range from less than €1,800 per annum to €120,000 or higher net household income per annum. There is a large number of ‘refused to answer’, ‘no answer’ and ‘don’t know’ answers in relation to household income in all three rounds of the European Social Survey.

Feeling about household's income

In all three rounds of the European Social Survey respondents are asked to assess how they feel they are coping on their household's present income. The respondents were asked to indicate if they felt they were: '*living comfortably on present income*', '*coping on present income*', '*finding it difficult on present income*' or '*finding it very difficult on present income*'. Dummy variables were again created to represent the four choices with respect to the question on financial satisfaction.

Age

The age variable has been grouped into five dummy variables. These variables represent those respondents who are less than 18 years of age, 18 to 34 years of age, 35 to 44 years of age, 45 to 64 years of age and those who are 65 years and over. This method of grouping individuals into these categories is consistent with previous research such as Helliwell (2003) and Gerdtham and Johannesson (2001) who also use these same age groups in their ordered probit estimations.

Religious Activities

Previous research has highlighted that religion is associated with greater well-being especially when religiosity is measured by actual religious behaviour, such as church attendance, rather than by attitude scales (Denier *et al*, 1999). As a result, the variable used in this paper to describe religion is 'attendance of religious services'. This is taken from the following question:

'Apart from special occasions such as weddings and funerals, about how often do you attend religious services nowadays?'

A number of dummy variables are created to describe how frequently one attends religious services varying from '*every day*' to '*never*'. This variable is chosen over a self-assessed level of religiousness on a scale of 1-10, which is also captured in the survey.

3.3 Empirical Techniques

The Theoretical Model

Based on the data described, a microeconomic well-being function is specified in this paper. This general formula has been adopted by both psychologists and economists in analysing large datasets containing levels of subjective well-being.

$$SWB_{it} = \beta_0 + \beta_1 HS_i + \beta X_{it} + \varepsilon_{it} \quad Eqn (3.3.1)$$

where, SWB = Reported Subjective Well-Being (Life Satisfaction) of individual *i* in time period *t*.

HS = Self-reported Health Status of individual i .

$X = x_1, x_2, \dots, x_n$ are known variables such as socio-demographic and socio-economic characteristics and environmental factors

ε = the error term. Unobserved characteristics and measurement errors are captured in the error term. Individual differences² in reporting levels of life satisfaction are captured within the error term.

This utility function purports that the reported subjective well-being SWB_i of individual i depends on his or her self-reported health status HS_i and on a variety of personal characteristics X_i . The model allows for an analysis of each of the factors that are correlated with subjective well-being to be undertaken. This approach has been successfully applied in a number of economic studies on the determinants of subjective well-being (Frey and Stutzer, 2002a; Blanchflower and Oswald, 2004; Korpi, 1997). Due to the fact that the answers to the life satisfaction question are ordinal rather than cardinal, they are best analysed via ordered probit equations (Graham, 2008).

The Ordered Probit Model

Hypothesis tests are carried out in probability models of discrete choice in order to ascertain;

- whether the explanatory factors that are included have a significant effect, individually or jointly, on the probability of choice
- whether an increase in an explanatory variable significantly increases or decreases the probability that an alternative will be chosen (Griffiths *et al*, 1993).

The ordered probit model has been widely used as a framework for analysing responses to well-being questions (Helliwell; 2003, Gerdtham and Johannesson; 2001, Frey *et al*; 2007). The ordered probit model is built around a latent regression in the same manner as the binomial probit model (Green, 2000). The ordered probit model is designed to model a discrete dependent variable that takes ordered multinomial outcomes and it is an extension of the binary probit model. Like the binary probit model the ordered probit model can be expressed in terms of an underlying latent variable y^* , in this case the individuals 'true life satisfaction'. The higher the value for y^* the more likely they are to report a higher category of self-assessed life-satisfaction.

² For example, one individual may rate their level of life satisfaction as 3 (on a scale of 0 to 10) but another individual may rate the same level of life satisfaction as 4.

The ordered logit model is a popular alternative to the ordered probit model. The logit model differs from the probit model only in the cumulative distribution function that is used to define choice probabilities (Griffiths *et al*, 1993). The cumulative distribution function for the logit model is not an integral form and according to Griffiths *et al* (1993) this makes the logit model somewhat easier to work with. However, a number of other studies on the determinants of well-being have successfully used the ordered probit model to econometrically estimate the well-being equation (Helliwell; 2003, Clark and Oswald; 1994, Blanchflower; 1996) and therefore this same model has been chosen in this paper.

A probit and logit model of discrete choice may be used in a case where an economic decision maker chooses between two mutually exclusive outcomes. A multinomial choice model allows for more than two alternatives and deals with alternatives that are not ordered in any way. However, in this paper the individual can choose among eleven alternative choices which are ordered on a scale of 0 - 10 for the level of life satisfaction they feel. Therefore, an ordinal probit regression model is used which has been designed for such an outcome variable as life satisfaction.

According to Greene (2000) if the responses to certain questions in an opinion survey, such as the life satisfaction question in the European Social Survey, are coded 0, 1, 2, 3, 4 10, then linear regression would treat the difference between a 4 and a 3 the same as that between a 3 and a 2, whereas in fact they are only a ranking. The ordered probit and logit models have recently been adopted in studies as a framework for analysing responses from opinion surveys (Zavoina and McElvey; 1975; Marcus and Greene; 1985).

The probit model is built around a latent regression (Greene, 2000) as follows;

$$y^* = \beta'x + \varepsilon \quad \text{Eqn (3.3.2)}$$

where, β is a vector of parameters not containing an intercept, y^* is unobserved, but the relationship between y^* and the observed variable y is:

$$\begin{aligned} y &= 0 && \text{if } y^* \leq 0, \\ y &= 1 && \text{if } 0 < y^* \leq \kappa_1, \\ y &= 2 && \text{if } \kappa_1 < y^* \leq \kappa_2, \\ &\cdot && \\ &\cdot && \\ y &= J && \text{if } \kappa_{j-1} \leq y^* , \end{aligned} \quad \text{Eqn (3.3.3)}$$

Here, the κ 's are threshold parameters, also known as cut points, to be estimated with β . In this paper the respondents express their own level of life satisfaction which is dependent on certain measurable factors \mathbf{x} and certain unobservable factors ε (Green, 2000). The respondents answer on a scale of 0 to 10 and indicate a number they feel most closely represents their feeling of true satisfaction with life (y^*). It must be noted that the mean ($\beta'\mathbf{x}$) of y^* (true life satisfaction) depends on the independent variables contained in the vector \mathbf{x} and therefore the whole distribution shifts when the value of one such variable changes, in a direction dictated by the sign of the corresponding β coefficient.

It is assumed that ε is normally distributed across observations and the mean and variance are normalised to 0 and 1. With the normal distribution the following probabilities hold

$$\begin{aligned}
 \text{Prob}(y = 0) &= \Phi(-\beta'\mathbf{x}), \\
 \text{Prob}(y = 1) &= \Phi(k_1 - \beta'\mathbf{x}) - \Phi(-\beta'\mathbf{x}), \\
 \text{Prob}(y = 2) &= \Phi(k_2 - \beta'\mathbf{x}) - \Phi(k_1 - \beta'\mathbf{x}), \\
 &\cdot \\
 &\cdot \\
 &\cdot \\
 \text{Prob}(y = J) &= 1 - \Phi(k_{j-1} - \beta'\mathbf{x})
 \end{aligned}
 \tag{Eqn (3.3.4)}$$

In the ordered probit model there are 11 categorical responses (0 to 10 on the life satisfaction scale). The probability that the responses for the j th observation is equal to the i th category is:

$$p_{ik} = \Pr(y_j = i) = \Phi(k_i - x_j\beta) - \Phi(k_{i-1} - x_j\beta)
 \tag{Eqn (3.3.5)}$$

where Φ is the standard normal cumulative distribution function, k_i is the i th cutpoint, x_j is the new vector of observed values of the independent variables for the j th observation, and β is the vector of regression coefficients (Stata Corp, 2008).

The structure of Eqn. 3.3.1 makes it suitable for estimation as an ordered probit. In this way the 'true' utility is the latent variable and the subjectivity of responses can be thought of as being swept into the error term (Blanchflower and Oswald, 2004). A specification test is performed to test the ordered nature of the discrete subjective well-being measure, similar to the one carried out by McBride (2001). In comparing the models a RESET test is used as a general check for the validity of the estimated coefficients. Although there are alternative tests for misspecification of

models the evidence provided by Horowitz (1994) suggests the RESET test is a fairly reliable and convenient general check. Thus this approach is used at the 1% level to discriminate between models. For those models not passing the RESET test it is concluded that the model is apparently mis-specified.

4. Results

This paper estimates three ordered probit models to determine the effect of health status, and a host of other personal and socio-economic characteristics on an individual's self-assessed level of life satisfaction. Table 1 presents the results from the estimation of this model using three rounds of the European Social Survey 2002/2003, 2004/2005 and 2006/2007. The explanatory variables include a number of individual characteristics such as health status, age, gender, marital status, educational attainment, religious activity, and trust in other people. The independent variables also include household income and four dummy variables for how one feels they are coping on their present household income. These variables have been chosen due to the fact that much of the literature surrounding the area of subjective well-being has found these variables to be statistically significant in explaining life satisfaction levels. Table 1 presents the estimated coefficients and their corresponding z-statistics for a test of the null hypothesis of statistical significance for all three ordered probit equations, one for each round of the European Social Survey. A number of the individual characteristics attributed to the respondent of the questionnaire have a direct effect on life satisfaction.

The coefficients on the explanatory variables have a qualitative interpretation (Jones, 2007). A positive coefficient means that an individual has a higher value of latent life satisfaction and is more likely to report a higher score on the life satisfaction scale. A negative value means that they have a lower value of the latent variable and are likely to report a lower score on the life satisfaction scale. The quantitative explanations that follow are made on the basis of average effects for the binary explanatory variables (Jones, 2007).

The first independent variable considered in Table 1 is the individual's self assessed health status which is measured on a five point scale, with 1 representing very good health and 5 representing very bad health. Health status is a significant explanatory variable, in most cases, and appears to greatly affect an individual's satisfaction with life. In all three rounds of the survey individuals who report their health as being '*very good*' are positively and significantly associated with an increase in their life satisfaction. In each case the result is proven to be significant at the 1% level.

In Round 1 individuals who assess their health as very good are more likely to experience an increase in their life satisfaction of 0.412, in Round 2 this figure is 0.357 and in Round 3 very good health is associated with a 0.349 increase in life satisfaction. Conversely those individuals who indicate that their health status is fair, bad or very bad are associated with decreases in their life satisfaction. In Round 1 the effects of fair, bad and very bad health on life satisfaction are clearly evident. An individual who is in fair health experiences a decrease in life satisfaction of -0.255. Having bad health lowers the dependent variable by -0.729. Moreover, an individual who is in 'very bad' health experiences a decrease in life satisfaction of as much as -1.692. This suggests that people who report lower levels of health status are also those who are experiencing lower levels of life satisfaction and well-being.

Previous studies have reported results on age to be U-shaped in pattern; that is decreasing until approximately 35-45 years of age and increasing thereafter. However this U-shaped pattern is only found in the results from Round 2 of the survey where the coefficient on age1 (under 18 years of age) is 0.239 which then decreases to its lowest point, -0.105, when an individual is between 35 and 44. The coefficient for age5 (65 years and over) is almost as high as age1 at 0.201. Round 2 results exhibit a U-shape with respect to age and life satisfaction and this finding is consistent with other studies that also find the same pattern (see for example, Oswald, 1997; Gerdtham and Johannesson, 2001; Blanchflower and Oswald, 2004). However many of the coefficients for the age variables in Round 2 are insignificant. Moreover, this U-shaped pattern of the age coefficients does not hold for Rounds 1 and 3 of the European Social Survey. In Round 1 the pattern is concave and in Round 3 it is decreasing from age1 to age5 although never negative. In both Rounds 1 and 2 the findings suggest that the age variable that represents individuals 65 years and over (age5) is significant and positively related to life satisfaction. Research has also found that age and gender are significant determinants of subjective well-being (Dolan *et al*, 2007). In this paper gender appears to only be significant in the Round 2 results, where males are associated with having lower life satisfaction than females. This result is consistent with previous research by Alesina, Di Tella and MacCulloch (2004) who found that women tend to be happier than their male counterparts. Furthermore, similar to the results presented in Table 1, Louis and Zhao (2002) report no gender differences. This indicates that other variables are more important than gender in explaining life satisfaction levels in Ireland.

The estimated effect of urbanisation in the models indicates that living in a big city has a significantly negative effect on life satisfaction in all three rounds of the European Social Survey.

This finding is consistent with other studies such as Gerdtham and Johannesson (2001), Hudson (2006) and Hayo (2004), who find that living in large cities is detrimental to life satisfaction and living in rural areas is beneficial. In Round 1 individuals who live in a big city experience a -0.298 drop in their life satisfaction. In Round 2 this figure is lower at -0.310 and in Round 3 is -0.42. This would suggest that those individuals who live in cities have a higher probability of experiencing lower subjective well-being than those living elsewhere. Living in a suburb or a town also yield significant and negative results in Rounds 1 and 2. Although insignificant, the coefficients on village and farm are both positive in Round 3 which suggests that people that live in these more rural areas have a higher probability of being more satisfied with life than those who live in cities.

Similar to the findings by Helliwell (2002), there appears to be no significant direct relationship between educational levels and life satisfaction in the three regressions undertaken in this research. The results indicate that those with little or no formal education are more satisfied with life than those who have leaving certificate or third level qualification. Those individuals who indicated as having a primary degree in Round 1 are associated with a negative relationship between education and life satisfaction with a coefficient of -0.281. This result is significant at the 5 % level.

Income is well documented in the literature as having a significant effect on subjective well-being (Clark, Frijters and Shields, 2007). However, in all three regressions the results for income are not statistically significant. It must be noted here that there was a very high number of non-responses with regards to answers on income. However, the results in Table 1 illustrate that one of the most significant findings in explaining life satisfaction is how an individual feels they are coping on their present household net income. *A priori*, one would assume that those who feel they are comfortable on their present household income would be much more satisfied with life than those who are coping or those who are finding it difficult or very difficult to cope. Indeed the ordered probit model has revealed that these predictions hold true. The result for the variable 'very difficult' in Round 3 exhibits the largest coefficient for any other variable in all three rounds of the survey at -1.06. In each round the results decrease from coping to difficult to very difficult. All of the differences are statistically significantly different from zero at the 99% level. This finding is consistent across all three rounds. Therefore, how one feels they are coping on their present household income appears to be a major factor in explaining life satisfaction levels.

In the marital status category in both Rounds 2 and 3 individuals who are separated from their spouse exhibit significant z-statistics and are found to be negatively associated with life satisfaction. Moreover, being single is found in all three regressions, to lower an individual's life satisfaction. The results are significant at the 1% level. This confirms earlier analysis carried out by Gerdtham and Johannesson (2001) using a Swedish dataset. Also in this category respondents who are widowed are found in Rounds 1 to experience a -0.221 drop in their life satisfaction and a -0.372 drop in Round 2.

Earlier research has found a strong correlation between measures of religious activity and subjective well-being (Helliwell, 2003). In this research, having a religious faith is indicated by how often one attends religious services, apart from weddings and other special occasions. Those individuals who admit to attending religious services on a daily basis are found to be more satisfied with life across all three rounds of the survey. Results from a study by Helliwell (2003) also find that higher life satisfaction is associated with church attendance of once or more a week. In Round 1 those individuals who attend religious services daily are associated with an increase in life satisfaction measures of 0.306, in Round 2 of 0.314 and in Round 3 of 0.347. All of the coefficients are statistically significant at the 95% level. Further evidence by Clark and Lelkes (2005) and Hayo (2004) find that regular engagement in religious activities is positively related to subjective well-being.

As one would expect unemployment is found to be negatively associated with life satisfaction in both Round 1 and Round 2 regressions. This result is not surprising as medical research by Baum *et al.* (1986) found that unemployment is a major cause of stress and ultimately lower life satisfaction. According to Dolan *et al.* (2007) studies consistently show negative effects of individual unemployment on subjective well-being. Using Round 3 data the coefficient on unemployment is positively related to life satisfaction. One explanation for this in the literature is that these individuals may have adapted to their unemployed status and it no longer affects their satisfaction with the life they lead. However, as it is not known for how long these individuals have been unemployed it is difficult to uphold this conclusion. Oswald and Powdthavee (2006) find that individuals adapt somewhat to disability and find that the longer a person is disabled reduces the negative impact of the disability. This may be one reason that the coefficients on disability in the first two models are positive.

The findings presented here suggest that poor health status, difficulty in coping on one's income, unemployment, urbanisation, and being single are all negative elements of a respondent's utility function and all contribute to dissatisfaction with life among those individuals in Ireland.

4.2 Testing the Specification of the Model

To test the specification of the ordered probit models a RESET test is performed. It is important to test the specification of the model as a mis-specified model will yield inaccurate results. The RESET test is used which can be viewed as a test of functional form. With the RESET Y_t is regressed on x_t , \hat{Y}_{2t} , and \hat{Y}_{3t} . The likelihood ratio statistic is used to test that the coefficients of the powers of \hat{Y}_t are zero (Godfrey, 1988). As only one proxy \hat{Y}^2 is included in the estimations the significance of its coefficient is assessed by the normal t-test. The results of the chi-squared value in two of the three ordered probit models indicates that two of the models have been specified to a high level. In Round 1 the chi2 value is 0.05 which indicates that the variables are significantly related to the dependent variable. In this model the variables are accounting for 82% of the variation in life satisfaction. In Round 3 the chi2 value estimated by the RESET test yields a very highly significant result of 0.0 and it can be concluded that the null hypothesis is that of correct specification. In this model the variables are shown to account for 95% of the variation in life satisfaction. Using both Round 1 and Round 3 data to estimate the ordered probit models the null hypothesis of chance is rejected and it is concluded that there is a statistically significant relationship between the explanatory variables and life satisfaction.

It is important to note that there may be variables that affect life satisfaction which have been omitted in the estimation of the model using the data from Round 2 of the survey. Furthermore, there may be other factors that are affecting individual well-being that are not captured in the survey. Helliwell and Putnam (2004) state that among the most powerful predictors of subjective well-being are; genetic make-up and personality factors such as optimism and self-esteem. These factors are not captured in the European Social Survey. This may be the reason the model, using Round 2, data is mis-specified as there may be a case of omitted variable bias.

5. Conclusions

This paper provides new evidence on the relationship between personal and socio-economic characteristics of individuals in Ireland and their level of subjective well-being, giving special consideration to health status. This paper extends previous work carried out in this area by using

data for Ireland which has not been previously utilised in a study of subjective well-being for the country.

The econometric analysis attempts to uncover the variables that appear to be the most highly correlated with individual subjective well-being. Of the variables the most significant of these was health status. A decrease in the health status variables from very good to very bad health had a discernable effect on the reported life satisfaction of individuals. The results of this paper indicate that people who report lower health status report on average lower life satisfaction, *ceteris paribus*.

This paper identifies the relationship between subjective well-being and a host of other individual characteristics and socio-economic variables including; age, gender, income, marital status, employment status and education. The results are consistent with the theoretical predictions and indicate that life satisfaction increases with urbanisation, unemployment and being single. Variables which have significance in explaining life satisfaction are the high levels of trust in other people and regular involvement in religious activities. In contrast to previous studies on the correlates of subjective well-being income is found to be insignificant in explaining life satisfaction. However, the results from how people feel they are coping on their present household's income are highly statistically significant in explaining life dissatisfaction. Individuals who are finding it '*difficult*' or '*very difficult*' to cope on their present household's income are less satisfied with life than those who feel they are only '*coping*' on their present income.

Results from this paper indicate the various factors that have a positive and negative impact on subjective well-being in Ireland. From the results it is evident that those individuals who are single, unemployed, living in big cities and are in poor health are associated with having low levels of life satisfaction. Studies such as the one by Koivumaa-Honkanen *et al* (2001) have proven that life dissatisfaction data is an important predictor of suicide and those individuals who indicate they are dissatisfied with life are more likely to commit suicide in the future. Therefore, it is imperative that the Government target single individuals living in cities or surrounding areas to ensure that support networks are available for them to use if they are contemplating suicide. Furthermore, the Government needs to target those in poor health by ensuring that the existing health services in Ireland are improved.

Table 1. Ordered Probit Results

Ordered Probit Estimates using Life Satisfaction as Dependent Variable

ROUND 1

Number of obs = 1724
 LR chi2(54) = 424.38
 Prob > chi2 = 0.0000
 Pseudo R2 = 0.0627
 Log likelihood = -3172.473

ROUND 2

Number of obs = 1767
 LR chi2(38) = 488.99
 Prob > chi2 = 0.0000
 Pseudo R2 = 0.0741
 Log likelihood = -3055.294

ROUND 3

Number of obs = 1264
 LR chi2(38) = 360.68
 Prob > chi2 = 0.0000
 Pseudo R2 = 0.0724
 Log likelihood = -2310.900

OPROBIT RESULTS	ESS ROUND 1		ESS ROUND 2		ESS ROUND 3	
	Beta Coefficient	Z-Stats	Beta Coefficient	Z-Stats	Beta Coefficient	Z-Stats
vghealth	0.412	7.17**	0.357	6.20**	0.349	5.15**
ghealth	-	-	-	-	-	-
fhealth	-0.255	-2.97**	-0.161	-1.93	-0.368	-3.86**
bhealth	-0.729	-3.54**	-0.599	-3.35**	-0.287	-1.37
vbhealth	-1.692	-3.88**	-0.629	-1.38	-0.875	-1.62
hamp1	-0.262	-1.54	-0.217	-1.43	-0.352	-1.87
hamp2	0.134	1.45	-0.202	-2.43*	0.021	0.21
hamp3	-	-	-	-	-	-
male	-0.094	-1.60	-0.198	-3.39**	-0.089	-1.30
female	-	-	-	-	-	-
age1	-0.406	-1.74	0.239	0.80	0.726	2.00*
age2	0.173	2.00*	0.102	1.14	0.129	1.33
age3	0.452	0.61	-0.105	-1.40	0.138	1.62
age4	-	-	-	-	-	-
age5	0.259	2.55*	0.201	2.18*	0.064	0.49
noeduc	0.096	0.69	0.102	0.68	0.394	2.49*
primeduc	0.120	1.44	0.172	2.08*	0.387	3.34**
jrcert	-	-	0.085	1.12	0.155	1.63
leavcert	-0.133	-1.76	-	-	-	-
dipcert	-0.130	-1.55	0.016	0.19	-0.053	-0.58
primdeg	-0.281	-2.38*	-0.049	-0.52	-0.130	-1.15
highdeg	-0.213	-1.86	-0.043	-0.32	-0.162	-1.43
inc1	0.019	0.21	-0.260	-1.40	-0.135	-0.89
inc2	-	-	0.038	0.55	-0.061	-0.74
inc3	-0.027	-0.40	-	-	-	-
inc4	-0.020	-0.22	-0.064	-0.82	0.000	0.00
comfort	0.355	5.93**	-	-	-	-
coping	-	-	-0.254	-4.39**	-0.375	-5.54**
difficult	-0.506	-6.05**	-0.667	-6.85**	-0.706	-6.04**
vdifficult	-0.704	-5.02**	-0.905	-5.01**	-1.06	-4.64**
married	-	-	-	-	-	-
separate	-0.098	-0.65	-0.453	-3.31**	-0.572	-3.34**
divorce	-0.168	-0.73	0.192	0.59	-0.188	-1.03
widow	-0.221	-1.97*	-0.372	-3.91**	-0.056	-0.45
single	-0.288	-3.84**	-0.385	-5.13**	-0.301	-3.81**
relday	0.306	2.00*	0.314	2.51*	0.347	2.00*
rel1wk	-	-	-	-	-	-
relmorewk	0.183	1.76	0.025	0.29	0.307	2.55*
rel1mth	-0.129	-1.58	-0.135	-1.64	-0.025	-0.26

* indicates significance at the 5% level
 ** indicates significance at the 1% level

Table 1. Ordered Probit Results Continued

OPROBIT RESULTS	ESS ROUND 1		ESS ROUND 2		ESS ROUND 3	
	Beta Coefficient	Z-Stats	Beta Coefficient	Z-Stats	Beta Coefficient	Z-Stats
relholy	-0.168	-1.87	-0.142	-1.52	-0.046	-0.42
relless	-0.068	-0.77	-0.106	-1.14	-0.180	-1.83
relnevr	-0.140	-1.53	-0.075	-0.73	0.007	0.07
bigcity	-0.298	-2.10*	-0.310	-3.01**	-0.420	-3.30**
suburb	-0.140	-2.05*	-0.092	-1.31	-0.129	-1.56
town	-0.194	-2.68*	-0.178	-2.52*	-	-
village	-0.157	-1.87	-0.135	-1.58	0.090	0.92
farm	-	-	-	-	0.145	1.72
paidwork	-	-	-	-	-	-
ineduc	0.059	0.46	0.245	1.76	-0.020	-0.11
unemployda	-0.320	-1.97*	-0.424	-2.13*	0.189	1.06
unemploydn	-0.313	-1.62	-0.329	-1.44	-	-
disabled	0.245	1.29	0.108	0.63	-0.062	-0.27
retired	0.076	0.71	0.023	0.25	0.187	1.44
homemaker	0.069	0.87	-0.190	-2.43*	-0.036	-0.40
other	0.326	1.35	-0.083	-0.20	0.316	0.93
tr0	0.338	2.46*	0.540	3.12**	0.617	3.68**
tr1	-0.142	-1.04	-0.449	-2.75**	0.083	0.48
tr2	-0.051	-0.45	-0.073	-0.54	-0.237	-1.71
tr3	0.026	0.24	-0.132	-1.22	0.008	0.07
tr4	-0.076	-0.70	-0.174	-1.63	-0.070	-0.58
tr5	-	-	-	-	-	-
tr6	0.041	0.44	0.056	0.61	-0.177	-1.73
tr7	0.215	2.45*	0.177	2.08*	0.094	0.96
tr8	0.198	2.31*	0.266	3.21**	0.304	2.97**
tr9	0.437	3.60**	0.548	4.78**	0.651	3.57**
tr10	0.593	3.56**	0.734	5.06**	0.637	3.45**

* indicates significance at the 5% level

** indicates significance at the 1% level

z-stats are for coefficient estimates and are calculated using robust standard errors

ROUND 1 CUTS			ROUND 2 CUTS			ROUND 3 CUTS		
-cut1	-2.712	0.153	-3.283	0.162	-2.840	0.179		
-cut2	-2.400	0.137	-3.100	0.149	-2.677	0.169		
-cut3	-2.154	0.130	-2.778	0.133	-2.391	0.157		
-cut4	-1.896	0.124	-2.483	0.124	-2.134	0.150		
-cut5	-1.617	0.120	-2.190	0.118	-1.800	0.143		
-cut6	-1.065	0.116	-1.672	0.111	-1.277	0.138		
-cut7	-0.763	0.115	-1.303	0.109	-0.919	0.136		
-cut8	-0.235	0.114	-0.747	0.107	-0.384	0.135		
-cut9	0.564	0.114	0.140	0.106	0.405	0.135		
-cut10	1.189	0.116	0.925	0.108	1.064	0.138		

OPROBIT 1 RESET TEST	OPROBIT 2 RESET TEST	OPROBIT 3 RESET TEST
chi2(1) = 0.05 Prob > chi2 = 0.8239	chi2(1) = 6.53 Prob > chi2 = 0.0106	chi2(1) = 0.00 Prob > chi2 = 0.9571