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Well-Being and Income,
A European Study

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PhD Dissertation
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DECLARATION

I hereby and formally declare that this work, entitled *Well-Being and Income, A European Study*, has been composed by myself, that it has not been accepted in any previous application for a degree and that the work of which it is a record has been done by myself.

Signed

Julia Henn

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ABSTRACT

The economics of well-being is an approach to evaluate well-being which combines the techniques commonly utilised by economists with those typically applied by psychologists (Graham, 2005). It relies on data concerning subjective well-being levels and a more expansive concept of utility than does conventional economics (Graham, 2005). The economics of well-being moves away from the decision utility approach of revealed preferences and measures well-being as the subjective overall assessment of one's life (Frey & Stutzer, 2000b). Easterlin (1974) pioneered the economics of well-being in the 1970s and finds that although average reported well-being levels reveal significant differences within countries, they do not have a strong correlation with average levels of national income.

The aim of this thesis is to explore the possible explanations of the apparent contradictory results provided by Easterlin (1974) by using cross sectional data of European residents obtained from the 2008 wave of the European Values Study. The aim of this thesis is achieved by estimating the well-being-income relationship in many different ways. Firstly, Chapter 4 presents an empirical analysis of the importance of absolute, reference and relative income on individual well-being levels in Ireland. Secondly, Chapter 5 examines the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe. Thirdly, Chapter 6 assesses the effect of income inequality on well-being levels in Europe.

The empirical assessment of this thesis is estimated by applying the ordered probit technique. A self-reported measure of life satisfaction and happiness is employed to measure individual well-being levels. The measurement of these dependent well-being variables are regarded as categorical and ordinal in nature (Ferrer-i-Carbonell & Frijters, 2004). This renders the ordered probit model an applicable estimation method (Borooah, 2002).

Numerous explanations, for Easterlin's (1974) apparent inconsistent results, have been suggested. The most prevalent explanation is that of relative income (Clark *et al.,* 2008). This explanation states that individuals are not merely concerned with their

absolute income but also care about their income relative to the income of others. Chapter 4 of this thesis presents an empirical analysis of the importance of absolute, reference and relative income on individual well-being in Ireland. Four primary hypotheses are tested: Firstly, whether individual income results in a positive effect on individual well-being; Secondly, whether reference group income results in a negative effect on individual well-being; Thirdly, whether relative income results in a positive effect on individual well-being; And finally, whether the effect of income on well-being is affected by the different definitions of well-being, namely that of happiness and life satisfaction.

Chapter 4 results show a statistically significant positive absolute income coefficient. Thus, in Ireland richer individuals are found to report higher levels of well-being than co-citizens at the bottom of the income distribution. Results show that an increase in absolute income raises the probability of reporting oneself as “very happy” by 7.4%. Reference income results find a negative coefficient illustrating that higher reference group income results in lower subjective well-being. Findings illustrate that an increase in reference income decreases the probability of reporting oneself as “very happy” by 7.2%. A positive relative income coefficient is found. Hence, in Ireland the richer a particular individual is compared to his/her reference group the higher subjective well-being that individual will possess. Results depict that rising relative income increases the probability by 0.1 percentage points of stating the highest happiness level. Reference and relative income findings are however, non-statistically significant. Chapter 4 also identifies that, in the context of considerable similarity, particular variations between the happiness and life satisfaction regression results are found. Primarily, findings illustrate that non-economic conditions have a larger effect on happiness than life satisfaction. Economic conditions however, depict a larger effect on life satisfaction than happiness.

Another prevalent explanation for the seemingly opposing Easterlin (1974) results is the modified Easterlin hypothesis. This hypothesis states that upon obtaining a particular income level, enabling the consumption of basic needs, income no longer affects well-being. Chapter 5 of this thesis assesses the validity of this widespread argument by presenting an empirical analysis of the existence of a particular income level beyond which a change in the well-being-income relationship occurs. Two

variations of the hypothesis are tested: The first hypothesis, that beyond a particular threshold of basic needs, income is uncorrelated with well-being; the second hypothesis, that the well-being-income relationship determined for poor economies differs from that determined for rich economies.

Chapter 5 across nation results, when estimating the well-being-logGDP gradient with a cut off level of per capita gross domestic product (GDP) of $15,000, reject both the first and second hypothesis. A visual examination of a non-parametric fit in the form of a local linear regression shows equivalent findings. Thus, Chapter 5 of this thesis fails to detect a particular GDP level beyond which economic growth has no effect on well-being. The positive correlation between well-being and income is not found to diminish as income increases and thus, the modified Easterlin hypothesis is rejected.

An alternative less widespread explanation, for the apparent self-contradictory Easterlin (1974) findings, is that of income inequality. Income inequality is conceptualized as a measure of income division, or dispersion within a particular nation (Billingsley, 2014). Globalization and market capitalism have increased inequality within most nations (Freeman, 2011). Numerous economic empirical studies claim that an increase in income inequality results in a decline in average well-being levels. Chapter 6 of this thesis assesses the validity of this finding by presenting an empirical analysis of the effect of income inequality on well-being levels. Three variations of the hypothesis are tested: Firstly, whether income inequality affects aggregate national well-being levels; Secondly, whether the well-being-income-inequality relationship determined for low income individuals differ from that determined for high income individuals; And finally, if the effect of income inequality on well-being is affected by the various definitions of well-being: precisely “happiness” and “life satisfaction”.

National inequality levels are measured by the Gini coefficient obtained from Eurostat data. When estimating the well-being-income-inequality gradient for all respondents, results in Chapter 6 reveal a highly statistically significant negative relationship. Results depict that an increase in income inequality decreases the probability of reporting oneself as “very happy” by 0.3%.When estimating the well-being-income-inequality gradient for both rich and poor respondents, with a cut-off level of annual

household income of $15,000, results also identify a highly statistically significant negative relationship. Findings illustrate that an increase in income inequality decreases the probability of poor individuals reporting themselves as “very happy” by 0.2%. Results show that an increase in income inequality decreases the probability of rich individuals reporting themselves as “very happy” by 0.4%. Therefore, irrespective of an individual’s income level, living in a nation which is characterised with high income inequality reduces well-being levels.

A vital aim of policy makers is to advance the well-being of citizens (Dolan & White, 2007). However, for this advancement to occur a clear consensus, regarding the well-being-income relationship, needs to emerge in economic literature. Using sophisticated econometric techniques this thesis tests the possible explanations of the apparent inconsistent results provided by Easterlin (1974). Therefore, this thesis provides reliable research which may be used when implementing well-being advancing policies.

CHAPTER 1
INTRODUCTION

1.1: Introduction

Richard A. Easterlin (1974) pioneered the economics of well-being in the 1970s and reports three important patterns within the self-reported well-being data. Firstly, Easterlin (1974) identifies that well-being levels across individuals within a specified country fluctuate directly with income. Secondly, Easterlin (1974) shows that the average reported well-being levels, within a given country, are constant over time despite significant economic growth. Thirdly, Easterlin (1974) finds that although average reported well-being levels reveal significant differences within countries, they do not have a strong correlation with average levels of national income. The Easterlin paradox refers to this contradiction: that average national well-being is unrelated to GDP per head while at the micro level, well-being and individual income are positively related.

The aim of this thesis is to identify the accuracy of the likely explanations for the seemingly conflicting results provided by Easterlin (1974) by employing cross sectional data of European residents acquired from the 2008 wave of the European Values Study (EVS). This aim is attained by approximating the well-being-income relationship in various methods. The EVS is a large-scale, cross-national survey research program which concerns itself with human values (EVS, 2011). Well-being is defined as an individual's evaluation of their own life regarded as a whole (Sarracino, 2013). This definition includes both positive and negative assessments (Diener, 2006). Research finds that reported subjective well-being is an adequate empirical approximation of individual utility (Frey & Stutzer, 2005).

This thesis employes self-reported measures of life satisfaction and happiness as indicators of individual well-being levels. Life satisfaction refers to the overall cognitive evaluation of an individual's own life (Helliwell & Putnam, 2004). Happiness refers to immediate positive or negative emotions experienced by an individual when considering all aspects of their life (Helliwell & Putnam, 2004). The

empirical assessment of this thesis is estimated by applying the ordered probit technique. The measurement of the dependent well-being variables, happiness and life satisfaction, are regarded as categorical and ordinal in nature (Ferrer-i-Carbonell & Frijters, 2004). This renders the ordered probit model as an applicable estimation method (Borooah, 2002).

Numerous explanations, for the seemingly opposing Easterlin (1974) results have been suggested. The most prevalent explanation of the Easterlin paradox is that of relative income (Clark *et al.,* 2008). This justification states that people not only care about their absolute level of income but also about their income relative to the incomes of their peer group. This encourages individuals to participate in the rat race for higher consumption levels. However, this does not alter their relative position, as most individuals engage in this rat race. Therefore, individuals fail to draw full enjoyment from economic growth (Easterlin, 2005a; Layard, 2005a; Clark *et al.*, 2006). Phrased alternatively, when national economic activity increases, individual incomes and reference incomes increase at comparable rates resulting in little or no variation amongst the two and thus, aggregate well-being levels remain constant.

Chapter 4 of this thesis presents an empirical analysis of the importance of absolute, reference and relative income on individual well-being levels in Ireland. Absolute income is defined as a monetary sum of all wages, salaries, pensions and other incomes that is received by a household after taxes and other deductions. Relative income is defined as the distance between one's own income to the income of a reference group while reference income is the average income of one's reference group (Ferrer-i-Carbonell, 2005). Economic studies mostly agree that the income of others has a significant negative correlation with well-being however, relative income does not provide a complete account of the Easterlin paradox (Di Tella & McCulloch, 2008).

Another prevalent explanation for the apparent contradictory results of the Easterlin paradox is that of the modified Easterlin hypothesis. This hypothesis states that even if well-being rises with income for poor individuals and nations, a satiation point is eventually reached, above which further income has no effect on well-being (Layard, 2005a). Thus, raising national and individual income does not increase well-being ad infinitum as increases in well-being tail off as absolute income rises (Frey & Stutzer,

2002b). This hypothesis assumes that once an individual's basic material needs are satisfied, non-material wealth such as health, family, friends and religion primarily determines an individual's well-being. Therefore, there is a limit to how much a nation's well-being can rise by increasing economic growth. Once a nation's GDP has surpassed the satiation point further economic growth has no effect on well-being. Chapter 5 of this thesis examines the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe.

An alternative explanation for the apparent opposing findings of the Easterlin paradox is that of income inequality. Income inequality is conceptualized as a measure of income division, or dispersion within a particular nation (Billingsley, 2014). Economic growth has been accompanied, in particular in English-speaking nations by a significant increase in income inequality (Irvin, 2008). The relative deprivation theory by Runciman (1966) predicts that growth in income inequality results in a rise in relative deprivation and a fall in individual well-being. Furthermore, high income inequality is associated with low social trust and division within society (Gustavsson & Jordahl, 2008). Additionally, it is related with social problems including poverty, deprivation, high crime rates (Beja, 2011) and a contradiction of basic ideas of justice (Alesina *et al.*, 2004). Individuals may also have an aversion towards income inequality if they believe that in a more equal society they would be better off (Piketty, 1995; Bénabou & Ok, 2001). Thus, the increase in well-being resulting from a rise in economic growth may be offset by the negative effect that income inequality has on well-being. Chapter 6 of this thesis assesses the effect of income inequality on well-being levels in Europe.

This thesis makes three chief contributions. Firstly, Chapter 4 provides an empirical analysis of the significance of absolute, reference and relative income on individual well-being in Ireland. Therefore, this thesis identifies the significance of individual and peer group income on well-being when explaining the opposing results of the Easterlin paradox. This contributes to the well-being literature as existing studies regarding the well-being-income relationship are founded on fragile and incomplete evidence (Stevenson & Wolfers, 2008). Concentrating on 2008 EVS Irish data when analysing the well-being-income relationship adds a unique characteristic to the well-being literature. No literature has been identified that exclusively focuses on the Irish

component of the EVS 2008 when establishing the relationship between well-being and absolute, reference and relative income. Accounting for reference income also contributes to the importance of this thesis as few well-being economic empirical analyses account for reference group income. Reference income is defined as the average income of one's reference group (Ferrer-i-Carbonell, 2005).

Secondly a contribution, to existing well-being research, is made by clarifying the existence of a specific income level after which an adjustment in the well-being-income relationship occurs. In an attempt to explain the opposing results of the Easterlin paradox, Chapter 5 of this thesis identifies whether a positive well-being-income relationship prevails only in low GDP per capita nations. This contributes to existing well-being literature as a clear consensus when regarding the existence or magnitude of the modified Easterlin hypothesis has not been reached. The previous inconsistent results may lead to policies which fail to increase or indeed reduce aggregate well-being levels. This thesis contributes to the evident need for reliable research into the relationship between well-being and income as economic growth matters only in so far as it increases individual well-being (Oswald, 1997).

Through the evaluation of the effect of income inequality on well-being a third contribution to the area of well-being economics is made. Chapter 6 establishes the implication of income inequality on well-being when explaining the conflicting results of the Easterlin paradox. Globalization and market capitalism have increased inequality within most nations (Freeman, 2011). However, income inequality may be seen as an indication of income mobility and available opportunities as well as being an indication of injustice. Income inequality remains a contentious area and its effect on individual well-being remains disputed within economic literature (Graham & Felton, 2005). This thesis contributes to the provision of effective well-being enhancing policies as it provides a clear consensus regarding the well-being-income-inequality relationship. Accounting for the alternative definitions of well-being also contributes to the importance of this thesis in the well-being literature. Limited economic empirical work has been completed on whether the effect of income on well-being is affected by the different definitions of well-being and therefore, this thesis contributes significantly to this vastly neglected topic.

1.2: Rational of Thesis

Happiness is considered as an ultimate goal of life (Frey & Stutzer, 2002a). Indeed virtually everybody wants to be happy (Frey & Stutzer, 2002b). Since the 1980s western nations have adopted neoliberal economic policies in pursuit of higher income (Barker & Martin, 2012). Both economic and policy makers often assume that increases in national income will correspond to increases in national well-being levels (McGillivray & Clarke, 2006). This assumption is made on the rational that all individuals gain from increases in total national wealth (Soubbotina & Sheram, 2000). Due to this belief economic growth has been a primary goal in the majority of modern states (McBride, 2001). Indeed, continuous economic growth is pursued by most politicians and is the benchmark against which electorates evaluate their progress (Barker & Martin, 2012).

Hicks (1940) and Pigou (1962) initiate the use of GDP as a measure of social well-being. Despite commonly accepting GDP as an adequate economic indicator it is also seen as an insufficient overall measurement of aggregate well-being in a nation (Soubbotina & Sheram, 2000). Pigou (1962) even acknowledges that well-being is more than total economic activity, as measured by GDP, and therefore is not an "*index of total welfare*" (Pigou, 1962:12). Indeed, recent arguments have emerged against the further attempt to increase material standards of living in developed economies, claiming that such increases will do little to increase aggregate well-being levels (Stevenson & Wolfers, 2008). These opinions are based on the Easterlin paradox - a key finding in the emerging well-being literature. This paradox suggests that despite a positive within nation relationship, there is no link between the level of national economic development and aggregate well-being of residents. In a series of influential studies Easterlin (1974; 1995; 2005a; 2005b) argues that the importance placed on continuous economic growth is ill-advised.

The Easterlin paradox raises questions about the sense of policies that pursue economic growth if they fail to increase well-being (Frank, 1999). If economic growth only has a slight effect on well-being levels it may be time, for current policies, to shift focus from continuous economic growth to maximising aggregate well-being. Layard (2005a) calls for an explicit government policy of maximizing aggregate well-being.

At a global level, pursuit of economic growth has been described as “illusory” as it fails to enhance the ultimate objective of increasing well-being (NG, 2008). Therefore, more than GDP is needed when determining social progress (NESC, 2009). Indeed, Layard (2005a) goes even further when stating that a revolution in economic thinking and policy formulation is required.

The rational of this thesis stems from the need for reliable research into the relationship between well-being and income. The importance of understanding the well-being-income relationship is underpinned by a vast quantity of economic literature. Existing research is however, characterised by discordant results which stem from the Easterlin paradox. These inconsistent findings may lead to policies which fail to increase or indeed reduce aggregate well-being levels. Economic growth matters only in so far as it increases individual well-being (Oswald, 1997). In order to encourage increases in aggregate national well-being, through effective evidence-based policymaking, academics need to investigate why the Easterlin paradox reports discordant results. This research may then be an aid when implementing well-being enhancing polices. Therefore, a clear consensus regarding the well-being-income relationship needs to emerge, in economic literature, in order to advise governments on effective well-being enhancing policies.

Numerous explanations, for the apparent contradictory results of the Easterlin paradox are investigated in this thesis. Firstly, several empirical results identify that well-being is determined by the discrepancy between absolute and relative income (Senik, 2005). When national economic activity increases, individual incomes and reference incomes increase at comparable rates and thus, aggregate well-being levels remain constant. If this relative finding is proven, well-being enhancing policy makers may consider the implementation of taxes which correct for the market failure that arises when individuals engage in the counterproductive rat race. The rat race occurs when individuals spend an ever increasing amount of time on income-earning activities and less and less time on well-being enhancing activities such as spending time with family and friends. Frank (1999) and Ireland (1998) conclude that this implies very high corrective taxes on incomes.

Another cited justification for the seemingly contrary Easterlin (1974) findings is the modified Easterlin hypothesis. This hypothesis states that raising income does not increase well-being ad infinitum as increases in well-being tail off as absolute income rises (Frey & Stutzer, 2002b). The confirmation of the accuracy and existence of the modified Easterlin hypothesis will aid well-being enhancing policy makers when deciding whether to implement a heavier tax burden on the rich.

An additional clarification for the apparent inconsistent findings of Easterlin (1974) stems from the effect that income inequality has on well-being. Doubts have been raised about the benefits to an economy with high rates of GDP growth without at the same time accounting for distributional effects (Angeriz *et al*., 2011). Economic growth has been complemented, primarily in English-speaking countries, by a significant rise in income inequality (Irvin, 2008). Therefore, the increase in well-being resulting from a rise in economic growth may be offset by the negative effect that income inequality has on well-being. This thesis provides an accurate understanding of the well-being-income-inequality relationship. These results may aid policy makers when determining whether to implement income redistribution in order to enhance aggregate well-being. The redistribution of income from rich to poor individuals will result in a more egalitarian society, in which incomes are not as widely dispersed. Thus, any negative effect of income inequality, resulting from increases in GDP, would be reduced.

A crucial aim of policy makers is to enhance the well-being of citizens (Dolan & White, 2007). However, for this advancement to occur a clear explanation, regarding the Easterlin paradox, needs to emerge in the economic literature. Employing sophisticated econometric techniques this thesis investigates the accuracy and possible explanations of the seemingly contradictory findings provided by Easterlin (1974). Hence, this thesis offers reliable research which may be used when applying well-being improving policies.

1.3: Empirical Literature Review

Neoclassical economics inferres individual utility, obtained from goods and services, from preferences revealed by the individual's market behaviour (Dolan *et al.*, 2008). In traditional economic models a person's utility is thought to be an increasing function of present and future consumption of goods, leisure and other amenities that is classically viewed as desirable (Frank, 1997). Confronted with limited incomes, individuals are assumed to choose among alternatives so as to maximize ones utility. Utility theory presumes that individuals are rational, fully informed, utility maximising and insatiable consumers. If individuals always favour more over less, then higher income results in higher well-being (Dolan *et al.*, 2008). Thus, neoclassical economists traditionally derive utility purely from absolute income as arbitrated by consumer preferences and choice (Graham, 2005). In other words, the degree of individual preferences that are fulfilled is directly correlated with individual utility within a rational individual's monetary budget constraint.

According to the utility maximisation principle the best choice is always the one that gives the most utility to the decision maker (Frey & Stutzer, 2000b). This notion beleves that an individual's utility depends on the basket of goods and services consumed and therefore, individuals living in rich, developed nations are happier than individuals in poor developing nations. However, the pioneering study by Easterlin (1974) reveals average levels of happiness to be fairly constant across nations. Thus, individuals living in rich and poor nations report equal happiness levels. This finding has resulted in debates concerning the correlation between well-being and income within economic literature since the 1970s (Ferrer-i-Carbonell, 2005). Literature in the area of behavioural economics has shown that individuals often make decisions that somewhat compromise their own well-being and thus, depart from the standard model of the rational economic agent (Kahneman & Krueger, 2006). If indeed, individuals display limited rationality when maximizing utility, then choices made do not necessarily mirror individual's true preferences. As a result of this, economists have become increasingly apprehensive with regards to the neoclassical preference theory when measuring utility (Frey & Stutzer, 2003).

In the past few years a number of economists deliberated over alternative ways of measuring utility (Dolan *et al.*, 2008). The economics of well-being merges techniques from economics and psychology when evaluating well-being and belives in a more extensive concept of utility than conventional economists (Graham, 2008). The economics of well-being moves away from the "decision utility" approach of revealed preferences and measures well-being as the subjective overall assessment of one's life (Frey & Stutzer, 2000b). In empirical analyses consurning well-being, instead of deriving utility from income and price data, individuals are directly questioned on their life satisfaction or happiness. Research finds that reported subjective well-being is an adequate empirical approximation of individual utility (Frey & Stutzer, 2005). As stated by Frey and Stutzer (2010: 43) "*Utility can and should be cardinally measured in the form of subjective well-being"*.

Easterlin (1974) established the economics of well-being in the 1970s. Well-being focuses on an individual's being (Gasper, 2004). Well-being has been defined as an individual's evaluation of their own life regarded as a whole (Sarracino, 2013). However, no clear consensus as to the definition of well-being has been found. This may be due to happiness and life satisfaction meaning different things to different individuals (Frey & Stutzer, 2003). Helliwell and Putnam (2004) conceptualise happiness as being relatively short-term, situation dependent expressions of mood. Whereas, life satisfaction is conceptualised as being a long-term stable evaluation of one's life (Helliwell & Putnam, 2004).

Easterlin (1974; 1995; 2001) shows that well-being levels across individuals within a specified nation fluctuate directly with income. However, national income increases do not result in greater national well-being levels (Easterlin, 1974). Easterlin's finding was confirmed by subsequent studies based on well-being and within nation income data. Diversely, studies based on well-being and across nation income data identify mixed results (Stevenson & Wolfers, 2008).

Several justifications, for the apparent inconsistent results when regarding the relationship between well-being and income, have been suggested (Clark *et al.*, 2008). Firstly, several empirical results show that well-being is determined by the discrepancy between absolute and relative income (Senik, 2005). This theory of

relative income specifies that an individual's well-being depends not only on absolute income but also on relative income. As stated by Easterlin "*happiness, or subjective well-being, varies directly with one's own income and inversely with the incomes of others*" (Easterlin, 1995: 36). What Easterlin (1995) refers to here as "others" constitutes a reference group. When national economic activity rises, individual incomes and reference incomes grow at similar rates causing little or no variation amongst the two and consequently, aggregate well-being levels remain unchanged. The effect of relative income on well-being has since been studied by a number of economists (Dolan *et al.,* 2008).

Another explanation for the apparent contradictory results is the modified Easterlin hypothesis. This hypothesis claims that upon earning a specific income level, permitting the consumption of basic needs, raising income further no longer results in more well-being. Thus, raising income does not increase well-being ad infinitum as increases in well-being tail off as absolute income rises (Frey & Stutzer, 2002b). This hypothesis assumes that once basic material requirements are fulfilled, non-material wealth including health and religion primarily determines individual well-being. This hypothesis coincides with the theory of diminishing marginal utility of consumption and income which is characterised by the neoclassical theory of utility.

Another cited clarification, for the apparent opposing Easterlin (1974) findings, stems from the effect that income inequality has on well-being. A negative well-being-income-inequality relationship is found by early economic literature (Morawetz *et al*., 1977). However, recent research reports diverse empirical results when determining the extent and whether income inequality affects subjective well-being (Alesina *et al.,* 2004; Graham & Felton, 2006; O'Connell, 2004). A common justification states that income inequality may be an indication of income mobility and available opportunities as well as being an indication of injustice (Graham & Felton, 2005). On the one side the tunnel effect theory by Hirschman and Rothschild (1973) states that individuals may value inequality if it indicates social mobility. Furthermore, national income inequality has been stated as an essential condition to generate incentives for economic activity and competitiveness (Clark, 2003; Alesina *et al.,* 2004; Verme, 2011). Indeed, economic policy of freedom and entrepreneurship may result in an increase in income inequality. However, such economic policies are also believed to result in greater

economic affluence and a perception of individual accountability for economic achievement in residents (De Haan & Sturm, 2000). From the tunnel effect theory's perspective, income inequality may result in greater individual well-being.

On the contrary, the relative deprivation theory by Runciman (1966) predicts that growth in income inequality will result in a rise in relative deprivation and a fall in individual well-being. Furthermore, high income inequality is associated with low social trust and divisions within society (Gustavsson & Jordahl, 2008). Additionally, it is related to social problems including poverty, deprivation, high crime rates (Beja, 2011) and a contradiction of basic ideas of justice (Alesina *et al.*, 2004). Individuals may also have an aversion towards income inequality if they believe that in a more equal society they would be better off (Piketty, 1995; Bénabou & Ok, 2001). Thus, from the relative deprivation theory's perspective income inequality is likely to result in lower individual well-being.

A clear consensus, regarding the well-being-income relationship, needs to emerge in economic literature. Using sophisticated econometric techniques this thesis tests the possible explanations of the apparent inconsistent results provided by Easterlin (1974). Therefore, this thesis provides reliable research which may be used when implementing well-being advancing policies.

1.4: Data Description

To explore the possible reasons for the seemingly conflicting results provided by Easterlin (1974) this thesis utilises data from the 2008 wave of the EVS. The EVS is a large-scale, cross-national survey research program which concerns itself with human values (EVS, 2011). In particular it provides insight into the opinions on family, work, religion, politics and society. The study was initiated by the European Value System Study Group in the late 1970s and has become an established network of social and political scientists working on data creation and processing (EVS, 2011). The EVS is to date, the most inclusive European research project on human values and is conducted every nine years. To date the following four EVS waves exist: 1981 (16 nations), 1990 (29 nations), 1999/2000 (33 nations), and 2008 (47 nations).

The dependent well-being variables of this thesis are happiness and life satisfaction. The EVS measurements of the dependent well-being variables are regarded as categorical and ordinal in nature (Ferrer-i-Carbonell & Frijters, 2004). The dependent variable "happiness" concerns itself with the self-reported answers to the question which reads as follows *"taking all things together how happy are you?"* Interviewees ranked their responses on an ordered scale, with the options of choosing "not at all happy", "not very happy", "quite happy" or "very happy". This thesis defines happiness as the immediate positive or negative emotions experienced by an individual when considering all aspects of their life. The life satisfaction question reads as follows *"how satisfied are you with your life?"* Interviewees ranked their responses on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). This thesis defines life satisfaction as the overall cognitive evaluation of an individual's own life.

The primary independent income variables of this thesis are derived from various sources. The household income variable is derived from the 2008 EVS data. National income is obtained from the World Bank's, International Comparison Program database. Income inequality is measured by the Gini coefficient data obtained from 2008 Eurostat data. This thesis augments EVS data with this national income and income inequality data.

1.5: Economic Techniques

This thesis provides a comprehensive understanding of the potential clarifications of the apparent contradictory Easterlin (1974) results. The aim of this thesis is achieved by estimating the well-being-income relationship in many different ways. Firstly, Chapter 4 presents an empirical analysis of the importance of absolute, reference and relative income on individual well-being levels in Ireland. Secondly, Chapter 5 examines the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe. Thirdly, Chapter 6 assesses the effect of income inequality on well-being levels in Europe.

Empirical analysis is uses when estimating the various explanations of the Easterlin paradox. An empirical analysis employs data to test a theory or to estimate a relationship (Wooldridge, 2015). Multiple regression analysis is utilised in this thesis as it identifies the intended relationships, while also controlling for other variables which simultaneously affect the dependent variable. A self-reported measure of life satisfaction and happiness is employed when quantifying individual well-being levels. The measurement of these dependent well-being variables are regarded as categorical and ordinal in nature (Ferrer-i-Carbonell & Frijters, 2004).

Variables with ordinal levels of measurement are, as well as being mutually exclusive categories, ordered categories from low to high (Morgan *et al.,* 2012). However, the differences between the responses are not uniform (Morgan *et al.,* 2012). Therefore, the four various happiness levels and 10 various life satisfaction levels possess a clear ranking as it is known which category is highest or more preferred on a dimension. However, the intervals between the various categories are not precise or equal (Leech *et al.,* 2008). Thus, it is unknown if the difference between "not at all happy" and "not very happy" or between "quite happy" and "very happy" are the same. The ratio between any two categories may not be measured (Gujarati, 2011).

These kinds of responses with ordered categories cannot be simply modelled using classical regression. Ordinary linear regression is unsuitable due to the dependent variable's noninterval nature as the spacing of the outcome choices may not be assumed as uniform (Gujarati, 2011). Alternatively, although it is possible to use

multinomial logit models, the ordinal nature of the dependent variable would not be accounted for. Therefore, such a model would not use all of the available information regarding the particular variable being examined. Ordered logit and probit models are extensively used when analysing ordinal scale data (Maddala, 1983).

This thesis employs an ordered probit model for several reasons. Firstly, the ordered probit model does not assume that a rise in subjective well-being from "not at all happy" to "not very happy" is identical to a rise from "quite happy" to "very happy" (McBride, 2001). Secondly, an ordered logit model assumes that the εi is logistically distributed whereas the ordered probit model assumes that the εi is normally distributed (Borooah, 2002). Greene (2000) argues that the justification of one distribution over the other is problematic on theoretical grounds. Researchers however, commonly assume a normal distribution when the true distribution is unknown (Greene, 2000). Lastly, subjective well-being measurements have an inherent ordering which is not accounted for when using a standard multinomial probit model (McBride, 2001). Ordered probit models account for this inherent ordering. The use of an ordered probit model is consistent with ordered probit models used by Clark and Oswald (1994), Plug (1997), Frey and Stutzer (1999; 2000a), Hartog and Oosterbeek (1998), Litchfield *et al.*, (2012), McBride (2001), Van Praag *et al.*, (2003) when assessing the well-being-income relationship.

Economic Techniques when evaluating the importance of absolute, reference and relative income on individual well-being levels in Ireland

Chapter 4 provides an empirical analysis of the influence of absolute, reference and relative income on individual well-being in Ireland. Four major hypotheses are tested:

- Firstly, if individual income causes a positive effect on individual well-being.
- Secondly, if reference group income results in a negative effect on individual well-being.
- Thirdly, whether relative income has a positive effect on individual well-being.

- Fourthly, whether the influence of income on well-being is affected by the varied definitions of well-being, specifically that of happiness and life satisfaction.

A subjective self-reported measure of life satisfaction and happiness is used in order to measure individual well-being levels. The ordered probit technique is applied to Irish data from the EVS 2008 when estimating the well-being equation. The set of control variables "*X*" employed include: gender, health, employment status, job satisfaction, region, religion and age.

The empirical analysis when testing the importance of absolute, reference and relative income on individual well-being levels in Ireland is founded on three different specifications of equation (1.5.1). Various included control variables are correlated with individual income and therefore including these variables, when determining the relationship between subjective well-being and income, is necessitated (Ferrer-i-Carbonell, 2005). The inclusion of particular control variables is based on previous economic literature and data availability. The subsequent equation portrays the assumed relationship for each individual *i* at a particular (constant) time *t*.

$$WB = SWB\ (y, y_r\ , X) \qquad \textbf{(1.5.1)}$$

Where:

WB	=	the economic concept of welfare or well-being
y	=	absolute family income
y_r	=	reference group income
X	=	the vector of variables including individual and household socio-economic and demographic characteristics

In order to test the four hypotheses the empirical analysis, of Chapter 4 of this thesis, is based on three various specifications of equation (1.5.1). To test whether individual income results in a positive effect on individual well-being the specification includes, in addition to *X*, merely absolute annual household income as a determinant of subjective well-being. In the EVS respondents did not record exact annual household income figures, instead determining (from 12 categories) which annual household income category they fell into. In order to acquire an absolute annual household

income measure a new absolute income variable was created for each individual. An individual's absolute income was made equal to the middle income of the appropriate income group. For example, if individual *i* stated an annual household income level of €36,000 to €60,000, then *i*'s absolute income is equal to €48,000. In relation to the lowest category (an annual household income of 1,800 euros or less) two thirds (1,200 euros) of the upper threshold of this category was made equal to the absolute income level. In relation to the highest category (an annual household income of 120,000 euro or more) one third of the income threshold (40,000 euros) was added to the income threshold (120,000 euros) in order to compute an absolute income level of 160,000 euros. This derivation is consistent with that done by McBride (2001). The well-being function is primarily believed to be concave in income (Ferrer-i-Carbonell, 2005) and subsequently this thesis presents absolute income in logarithmic form.

To test whether reference group income results in a negative effect on individual well-being the specification includes, in addition to *X*, absolute annual household income and reference group income as determinants of subjective well-being. This thesis defines the reference group as individuals who are living in the same region, possess the same education level and are in the age range of five years younger and five years older than the individual concerned. This definition is similar to that used by Ferrer-i-Carbonell (2005). This thesis defines the reference group income as the average income of all individuals in the reference group. Few economic empirical analyses, which focus on well-being and income, account for reference group income. Some studies that do are Clark and Oswald (1996), Kapteyn and Van Herwaarden (1980), Kapteyn *et al.*, (1997), McBride (2001) and Ferrer-i-Carbonell (2005). These studies all find reference group income to have a negative effect on individual well-being. As with absolute annual household income this thesis presents reference group income in logarithmic form.

To test whether relative income results in a positive effect on individual well-being the specification includes, in addition to *X*, absolute annual household income and relative income as determinants of subjective well-being. In this thesis the term relative income refers to a person's position in the income distribution. This is consistent with the definition used by Blanchflower and Oswald (2004a). Blanchflower and Oswald (2004a: 16) define the relative income variable as "*the ratio*

of the individual's income to the state income per capita". EVS data does not possess a relative income variable and therefore, one was derived by implementing the following steps:

i. Firstly, as previously described, the reference group is identified. The reference group is defined as individuals who are living in the same region, possess the same education level and are in the age range of five years younger and five years older than the individual concerned (Ferrer-i-Carbonell, 2005).

ii. Secondly, the reference income, of the identified reference groups, is calculated. The reference income is defined as the average income of all individuals in the same reference group (Ferrer-i-Carbonell, 2005). The reference income is derived as the sum of the absolute income of all individuals in each reference group divided by the number of individuals in that precise reference group.

iii. Thirdly, relative income is derived. This is done by calculating the difference between the logarithm of individual's absolute annual household income and the logarithm of reference income. Thus, relative income = log absolute income - log reference income.

To test whether the effect of income on well-being is affected by the different definitions of well-being the first three hypotheses are tested twice. Firstly the EVS happiness variable and secondly the EVS life satisfaction variable is used as a measure of well-being. Results from both well-being regressions are then distinguished.

Economic Techniques when examining the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe

Chapter 5 tests the presence of a precise income level beyond which a modification in the well-being-income relationship happens in Europe. This assertion is referred to as the modified Easterlin hypothesis (Stevenson & Wolfers, 2013). The macroeconomic empirical work presents an analysis of the existence of a particular income level beyond which a change in the well-being-GDP relationship occurs. This is achieved

through the estimation of separate "rich nation" and "poor nation" ordered probit regressions. The measure of economic development is the log of GDP per capita based on PPP (in international $), obtained from the World Bank's, International Comparison Program database. "Rich" nations are defined as those with per capita income in excess of $15,000 and "poor" nations as those with per capita income of less than $15,000 (Layard, 2003).

The empirical assessment, of whether nations of diverse levels of economic development possess various average levels of national well-being, is derived from ordered probit regressions of the following form:

$$WB_n = \alpha + \beta poor I(GDP_n < k) \times (log(GDP_n) - log(k)) + \beta rich I(GDP_n \geq k) \times (log(GDP_n) - log(k)) + \varepsilon_n \quad \textbf{(1.5.2)}$$

Where:

WB	=	dependent variable namey individual well-being
n	=	nation
a	=	constant
βpoor	=	well-being-income gradient for "poor" nations (GDP<$k)
GDP	=	per capita gross domestic product
k	=	cut of level of GDP per capita
βrich	=	well-being-income gradient for "rich" nations (GDP≥$k)
ε	=	error term

The coefficients on the explanatory variables are the interaction of log per capita GDP with a dummy variable depicting if per capita GDP is over or under a cut of level, $k ($15,000). The functional form, when calculating log(GDP) relative to a threshold income, permits for a shift in the well-being-income gradient once per capita GDP surpasses the particular threshold. This specification enables Chapter 5 of this thesis to test two variations of the modified Easterlin hypothesis. Firstly whether, beyond a particular threshold of basic needs, income is uncorrelated with well-being ($\beta rich = 0$) and secondly, whether the well-being-income relationship determined for poor nations differ from that determined for rich nations ($\beta poor > \beta rich$). The above cross-national regression form is consistent with that used in Stevenson and Wolfers (2013).

In addition to the statistical evidence, Chapter 5 of this thesis exhibits a scatter plot and a non-parametric fit of the income-well-being data to enable a visual assessment of whether the income-well-being relationship changes at any particular income level threshold. This scatter plot displays average levels of well-being and GDP per capita plotted on a log scale. The solid line of this scatter plot reveals the results from an OLS regression, estimated for all observations:

$$WB_n = \alpha + \beta \log (GDP_n) + \varepsilon_n \qquad \textbf{(1.5.3)}$$

Where:

WB	=	dependent variable namey individual well-being
n	=	nation
a	=	constant
log GDP	=	explanatory variable
ε	=	error term

This scatter plot visually depicts the well-being-GDP relationship. A local linear regression in the form of a dotted line is also illustrated. This permits a non-parametric fit of the well-being-income relationship. If a particular national income level, beyond which a change in the well-being-income relationship exists, than this non-parametric fit would flatten out once this particular national income level is reached. This scatter plot and non-parametric fit is consistent with that used in Stevenson and Wolfers (2013).

Economic Techniques when assessing the effect of income inequality on well-being levels in Europe

Chapter 6 of this thesis presents an empirical analysis of the effect of income inequality on European resident's well-being levels. Three deviations of the hypothesis are tested:

- Firstly, if income inequality affects total national well-being levels.
- Secondly, if the well-being-income-inequality relationship specified for low income individuals fluctuates from that determined for high income individuals.

- Thirdly, whether the effect of income inequality on well-being is affected by the various definitions of well-being.

The empirical assessment is estimated by using the ordered probit technique on cross sectional data of European residents acquired from the 2008 wave of the EVS. A self-reported measure of life satisfaction and happiness is employed to quantify individual well-being levels. National income inequality levels are calculated by the Gini coefficient attained from Eurostat data. "Rich" individuals are defined as those with annual household income over $15,000 and "poor" individuals as those with annual household income under $15,000.

To determine the effect of income inequality on aggregate national well-being levels, Chapter 6 of this thesis uses the empirical examination of the subsequent ordered probit regressions:

- An ordered probit regression estimating the well-being-income-inequality gradient for all European citizens.
- An ordered probit regression estimating the well-being-income-inequality gradient for poor European citizens with a cut-off level of annual household income of $15,000.
- An ordered probit regression estimating the well-being-income-inequality gradient for rich European citizens with a cut-off level of annual household income of $15,000.

The empirical assessment is derived from ordered probit regressions of the following form:

$$WB_{int}^{ws/\bar{p}/\bar{r}} = a^{ws/\bar{p}/\bar{r}} Inequality_{nt} + \beta^{ws/\bar{p}/\bar{r}} GDP_{nt} + \delta^{ws/\bar{p}/\bar{r}} MICRO_{int} + \varepsilon_{int}^{ws/\bar{p}/\bar{r}} \quad \textbf{(1.5.4)}$$

Where:

WB	=	well-being responses namely happiness and life satisfaction
ws/p/r	=	states that either the whole sample, poor or rich individuals are considered
i	=	individual

n	=	nation
t	=	year (constant at 2008)
a	=	constant
Inequality	=	national income inequality
GDP	=	national GDP per capita, measured at PPP (international $)
MICRO	=	set of personal characteristics found to affect individual well-being
ε	=	error term

The empirical analysis of Chapter 6 of this thesis is based on three various specifications of equation (1.5.4). To test whether income inequality affects aggregate national well-being levels, the model includes national income inequality as well as national income, absolute income, religion, health, job satisfaction, gender, marital status, employment and age, as determinants of all European citizen's subjective well-being. National income inequality is measured by the Gini coefficient variable obtained from 2008 Eurostat data. Economic development lowers national inequality and reduces corruption and therefore, controlling for GDP per capita (national income) is required when deriving the effect of national income inequality on individual well-being levels (Zagorski *et al.,* 2014).

Data on individual well-being, annual household income and the MICRO (individual characteristics) variables are obtained from the 2008 wave of the EVS. In the EVS respondents did not record exact annual household income figures. The 2008 wave of the EVS records monthly household income (x1000) measured at PPP (in Euros). In order to acquire an annual household income measure for each individual a new income variable was created. An individual's annual household income was derived by multiplying the recorded monthly household income by 1000 and then by 12. 2008 European Central Bank data on the reference exchange rate of US dollar/euro is used in order to convert income data from euros into dollars. This new variable records annual household income measured at PPP (international $). The well-being function is primarily believed to be concave in income (Ferrer-i-Carbonell, 2005) and subsequently this thesis presents absolute income in logarithmic form.

The set of MICRO control variables employed in Chapter 6 of this thesis include: religion, health, job satisfaction, gender, marital status, employment and age. Various included control variables are correlated with individual income (Ferrer-i-Carbonell,

2005). The inclusion of particular control variables is based on previous economic literature and data availability. For more insight into the included determinants of well-being see literature on employment (Blanchflower & Oswald, 1998), gender (Alesina *et al.*, 2004), health (Gerdtham & Johannesson, 2001), religion (Helliwell, 2003), job satisfaction (Clark & Oswald, 1996), marital status (Alesina *et al.*, 2004) and age (Blanchflower & Oswald, 2004a; Ferrer-i-Carbonell & Gowdy, 2007).

To test whether the well-being-income-inequality relationship determined for low income individuals differ from that determined for high income individuals, Chapter 6 of this thesis divides EVS data into rich and poor individuals. "Rich" individuals are defined as those with an annual household income in excess of $15,000 and "poor" as those with an annual household income of less than $15,000 (Layard, 2003). Two models are then tested for both rich and poor individuals. The first model merely includes national income inequality as a determinant of both rich and poor European citizen's subjective well-being. Due to the concern of omitted variable bias the second model tests for income inequality as well as national income, absolute income, religion, health, job satisfaction, gender, marital status, employment and age. Results from rich and poor European citizens are then compared.

In order to test, if the effect of income inequality on well-being is affected by the various definitions of well-being, the first two hypotheses are tested twice. Firstly the EVS happiness variable is employed as a calculation of well-being and secondly, the EVS life satisfaction variable is used as a measure of well-being. Results from both well-being regressions are then compared.

1.6: Organisation of Thesis

Chapter 2 reviews the literature of the theoretical and empirical studies which concern themselves with well-being. Section 2.1 entails an introduction to the well-being and income literature. This includes the various definitions of happiness and life satisfaction (Subsection 2.1.1). Different definitions of income, used in the economic literature, are outlined in Subsection 2.1.2. This is followed by several theories of well-being used in economic literature (Subsection 2.1.3). Well-being and utility theory is discussed in Subsection 2.1.4.

Section 2.2 concerns itself with the literature review of Chapter 4. Subsection 2.2.1 focuses on national cross-sectional comparisons of well-being and income. This is followed by Subsection 2.2.2 an economic literature review of the well-being-income comparison effect. Subsection 2.2.3 is a literature review of the other variables affecting well-being which are often focused on in economic studies. These include employment status, religion, health, age, gender and marital status. Subsection 2.2.4 consists of a literature review of economic studies which distinguish between the two well-being terms, happiness and life satisfaction. Subsection 2.2.5 reviews the literature on the methodological issues and the empirical approach of Chapter 4.

Section 2.3 concerns itself with the literature review of Chapter 5. Subsection 2.3.1 focuses on cross-country comparisons of well-being and income. This is followed by Subsection 2.3.2 an economic literature review of the existence of a satiation point in the well-being-income relationship. Subsection 2.3.3 consists of a literature review of the methodological issues which arose and the empirical approach of Chapter 5.

Section 2.4 concerns itself with the literature review of Chapter 6. Subsection 2.4.1 focuses on the definition and theories of income inequality. This is followed by Subsection 2.4.2 a literature review of the effects of income inequality on well-being. Subsection 2.4.3 consists of a literature review of the methodological issues and empirical approach of Chapter 6. Section 2.5 entails the chapter conclusion.

Chapter 3 consists of a description of the data used in this thesis. Section 3.1 contains an overview of the well-being variable. Section 3.2 contains a detailed description of

the EVS. This is followed by Section 3.3 a comprehensive account focusing solely on variables used in Chapter 4 of this thesis. This section also presents the summary statistics of all dependent and independent variables used in Chapter 4 in table form. Section 3.4 depicts variables used in Chapter 5. The summary statistics of all dependent and independent variables used in Chapter 5 is also presented in table form. Section 3.5 focuses on the variables used in Chapter 6. This section contains the summary statistics of all dependent and independent variables used in Chapter 6 in table form. Section 3.6 is comprised of the chapter conclusion.

Chapter 4 contains the empirical analysis of the importance of absolute, reference and relative income on individual well-being in Ireland. The well-being equation is estimated via an ordered probit model using cross-sectional Irish data from the 2008 EVS. Section 4.1 discusses the empirical techniques. Section 4.2 estimates absolute, reference and relative income results. Section 4.3 presents results from the additional explanatory variables. Section 4.4 describes the difference between life satisfaction and happiness results. Section 4.5 outlines the post estimation diagnostics. Section 4.6 concludes.

Chapter 5 contains clarification of the existence of a particular income level beyond which a change in the well-being-income relationship occurs. Section 5.1 discusses the empirical techniques. Section 5.2 describes the non-parametric fit of the well-being-income relationship. Section 5.3 presents the cross national evidence of a satiation point in the well-being-income relationship. Section 5.4 estimates the within nation evidence of a satiation point in the well-being-income relationship. Section 5.5 presents the difference between life satisfaction and happiness results. A discussion of results is offered in each section. Section 5.6 outlines the post estimation diagnostics. Section 5.7 concludes this chapter.

Chapter 6 assesses the effect of income inequality on well-being levels in Europe. Section 6.1 discusses the empirical techniques. Section 6.2 describes the effect of income inequality on aggregate national well-being levels. Section 6.3 presents the effect of income inequality on poor individuals. Section 6.4 estimates the effect of income inequality on rich individuals. Section 6.5 describes the difference between rich and poor individual results. A discussion of results is offered in each section.

Section 6.6 presents the difference between life satisfaction and happiness results. Section 6.7 outlines the post estimation diagnostics. Section 6.8 concludes this chapter.

Chapter 7 concludes this thesis and presents the chapter summary, primary empirical results, policy implications and future research arising from this thesis.

1.7: Chapter Conclusion

Easterlin (1974) finds that average national well-being is unrelated to GDP per head. At the same time, in the microeconomic literature, Easterlin (1974) identifies a statistically significant positive correlation between individual measures of subjective well-being and individual income.

The aim of this thesis is to explore the possible explanations of the apparent inconsistent results provided by Easterlin (1974). The rational of this thesis stems from the need for reliable research into the relationship between well-being and income. The understanding of the well-being-income relationship is underpinned by a vast quantity of economic literature. Existing research is however, characterised by discordant results which stem from the Easterlin paradox. These opposing results may lead to policies which fail to increase or indeed reduce aggregate well-being levels.

Happiness is considered as an ultimate goal of life (Frey & Stutzer, 2002a). Thus, economic growth matters only in so far as it increases individual well-being (Oswald, 1997). In order to encourage increases in aggregate national well-being, through effective evidence-based policymaking, academics need to investigate why these discordant results of the Easterlin paradox occur. This research may then be used when implementing well-being enhancing polices. Therefore, a clear consensus regarding the well-being-income relationship needs to emerge, in economic literature, in order to advise governments on effective well-being enhancing policies.

The aim of this thesis is to explore the possible explanations of the apparent inconsistent results provided by Easterlin (1974) by using cross sectional data of European residents obtained from the 2008 wave of the EVS. The aim of this thesis is achieved by estimating the well-being-income relationship in many different ways. Firstly, Chapter 4 presents an empirical analysis of the importance of absolute, reference and relative income on individual well-being levels in Ireland. Secondly, Chapter 5 examines the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe. Thirdly, Chapter 6 assesses the effect of income inequality on well-being levels in Europe. The empirical assessment, of Chapter 4, Chapter 5 and Chapter 6, is estimated by applying the

ordered probit technique. A self-reported measure of life satisfaction and happiness is employed to measure individual well-being levels.

A vital aim of policy makers is to advance the well-being of citizens (Dolan & White, 2007). However, for this advancement to occur a clear explanation, regarding the Easterlin paradox, needs to emerge in economic literature. Using sophisticated econometric techniques this thesis establishes the possible explanations of the apparent contradictory results provided by Easterlin (1974). Therefore, this thesis provides reliable research which may be used when implementing well-being enhancing policies.

CHAPTER 2
EMPIRICAL LITERATURE REVIEW

The aim of this thesis is to explore the possible explanations of the apparent contradictory results provided by Easterlin (1974) by using cross sectional data of European residents obtained from the 2008 wave of the EVS. Easterlin (1974) reports that average national well-being is unrelated to GDP per head. At the same time, Easterlin (1974) shows that, in the microeconomic literature, there is a statistically significant positive correlation between individual measures of subjective well-being and individual income. The aim of this thesis is achieved by estimating the well-being-income relationship in many different ways. Firstly, Chapter 4 presents an empirical analysis of the importance of absolute, reference and relative income on individual well-being levels in Ireland. Secondly, Chapter 5 examines the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe. Thirdly, Chapter 6 assesses the effect of income inequality on well-being levels in Europe.

This chapter reviews existing empirical literature in the area of well-being and income. Section 2.1 examines the concepts and theories of well-being and income by reviewing existing research in the area. Section 2.2 comprises of an empirical literature review of the importance of absolute, reference and relative income on individual well-being in Ireland. Section 2.3 contains empirical literature relating to the analysis of the existence of a particular income level beyond which a change in the well-being-income relationship occurs. Section 2.4 reviews empirical literature concerning the effect of income inequality on resident's well-being levels. Section 2.5 concludes this chapter.

2.1: Well-Being and Income: An Introduction

This section examines the concept of well-being and income by reviewing existing research in this area. Beyond defining both well-being and income this section also discusses the various theories of well-being and utility theory.

2.1.1: Definition of Well-Being: Happiness and Life Satisfaction

Well-being focuses on an individual's being (Gasper, 2004). Numerous terms appear in the economic literature when labelling the concept of well-being. Included well-being terms are quality of life, happiness, life satisfaction, living standards, social welfare, welfare, human development, utility, needs fulfilment and prosperity (Bukenya *et al*., 2003; McBride, 2001; Easterlin, 2001; Frey & Stutzer, 2005; Clark & Oswald, 1994; Helliwell, 2003). Certain terms have distinct meanings however, a great overlap exists in their fundamental definitions (McGillivray & Clark, 2006). Particular well-being terms are used by some studies (McBride, 2001), whereas others use various terms interchangeably (Easterlin, 2001).

The term well-being is ambiguous (Gasper, 2004). Some economic literature has attempted to define the concept of well-being. Well-being is an individual's evaluation of their own life regarded as a whole (Sarracino, 2013). Well-being has been defined as a composite measure of life satisfaction, positive affect, and negative affect (Frank, 1997). Well-being, are people's positive evaluations of their lives, including positive emotions, engagements, satisfaction, and meaning (Seligman, 2004). Well-being is related to an individual's physical, social and mental state (NESC, 2009). However, no clear consensus as to the definition of well-being has been found. This may be due to happiness and life satisfaction meaning different things to different individuals (Frey & Stutzer, 2003).

Some economic literature differentiates between brief emotional episodes of happiness or periods of joy and an underlying sense of satisfaction. According to Helliwell (2003) data on happiness may indicate brief periods of joy and may be responsive to short-term circumstances. Life satisfaction data however, tends to characterise an underlying state of well-being (Helliwell, 2003). Similarly, Helliwell

and Putnam (2004) conceptualise happiness as being relatively short-term, situation dependent expressions of mood. Whereas, life satisfaction is conceptualised as being a long-term stable evaluation of one's life (Helliwell & Putnam, 2004). The two well-being concepts are highly correlated and numerous economic studies do not make any distinction between them (Kahneman & Krueger, 2006). Table 2.1.1 presents various definitions of well-being used in the economic literature.

Table 2.1.1: Definitions of Well-Being: Happiness and Life Satisfaction

Source	Definition
Easterlin, (1974:90)	*"Happiness corresponds to social welfare, or welfare at large" "social welfare, i.e., human happiness"*
Veenhoven, (1991:2)	*"Happiness is conceived here as the degree to which an individual judges the overall quality of his life favourably"*
Frank, (1997:1832)	*"Subjective well-being, (is) a composite measure of life satisfaction, positive affect, and negative affect"*
Helliwell and Putnam, (2004:1435)	*"Self-ratings of 'happiness' turn out to reflect relatively short-term, situation-dependent expressions of mood, whereas self-ratings of 'life satisfaction' appear to measure longer-term, more stable evaluations"*
Gasper, (2004:3)	*"The term "well-being" is ambiguous: it has many usages, meanings, conceptions. Well-being seems to be used to refer to whatever is assessed in an evaluation of a person's situation, or, more fittingly and narrowly, in any such evaluation which is focused on the person's being" "The term "welfare" can mean how well people live"*
Blanchflower and Oswald, (2004b:3)	"*How should we conceptualize "happiness"? One definition is the degree to which an individual judges the overall quality of his or her life as favourable"*
Kahneman and Krueger, (2006:6)	*"Life satisfaction is neither a direct, verifiable experience nor a known personal fact like one's address or age. It is a global retrospective judgment, which in most cases is constructed only when asked and is determined in part by the respondent's current mood and memory, and by the immediate context"*
NESC, (2009:1)	*"Well-being is a positive physical, social and mental state"*
Sarracino, (2013:3)	*"Subjective wellbeing (SWB), that is to say individual's evaluation of its own well-being. In this context, the words "happiness" and "subjective well-being" are considered synonyms and are generally referred to as an evaluation of one's own life regarded as a whole"*

(Source: Author's own)

2.1.2: Definition of Income

The definition of income, for a particular household unit in a particular year, is the sum of income earned in production (including wages, interest, rent, royalties and dividends), transfer payments (including social welfare and food stamps) and total gains on capital assets (Jenkins, 1991).

A more comprehensive definition of income incorporates the element of sustainability. Here income, in a given period, is defined as the sum an individual could have spent while sustaining the value of his wealth intact (Atkinson, 1974). Indeed the widely accepted economic definition of personal income is the sum of money, in a given time period, that an individual can spend in consumption without modifying the value of his/her wealth (Lindahl, 1933; Simons, 1938; Atkinson, 1983). Hicks (1939) defines income as the maximum value that could be consumed without hindering the capacity to maintain this consumption level in the future. These more comprehensive definitions correspond to that of net income which takes depreciation into account when calculating gross income (defined by Jenkins (1991) as the sum of labour market earnings from all household members). Thus, net income could be classified as sustainable income as this level of income, in principle, could be upheld indefinitely. Table 2.1.2 presents various definitions of income used in the economic literature.

Table 2.1.2: Definitions of Income

Source	Definition
Simons, (1938:50)	*"Personal income may be defined as the sum of: 1. The market value of rights exercised in consumption and 2. The change in the value of the store of property rights between the beginning and the end of the period"*
Hicks, (1939:172)	*"Income is the maximum value which a man can consume during a week and still expect to be as well-off at the end of the week as he was at the beginning"*
Atkinson, (1974:39)	*"Income in a given period is the amount a person could have spent while maintaining the value of his wealth intact"*
Jenkins, (1991:2)	*"Gross household income in a given year is the sum, across all households members, of labour market earnings from employment or self-employment, income from savings and investments, incoming private transfers such as receipts of gifts or alimony, and public transfers such as social insurance or social assistance benefits"*

(Source: Author's own)

2.1.3: Theories of Well-Being

While the exact definition of well-being is controversial, the exact origin of well-being is also disputed. There are various theories of well-being, which differ in assumptions when concerning what information individuals use when evaluating their lives. Which theory governments believe to be credible may significantly influence the standard of living in their nation.

The subjective well-being literature distinguishes between three theories when concerning cultural differences in well-being (Van Hemert *et al.,* 2002). The first, the comparison theory of well-being, states that well-being is reliant on comparisons with conditions from other time's and other individual's (Veenhoven & Ehrhardt, 1995). Two categories of comparisons are distinguished: "Social comparison" comprises of comparisons with other individuals and "lifetime comparison" encompasses comparisons with other periods of one's life (Veenhoven & Ehrhardt, 1995). This theory highlights the importance of relative standards of living in contrast to absolute living conditions.

The second, folklore theory of well-being (Veenhoven & Ehrhardt, 1995) is an implicit theory, stating that well-being is predetermined in the national character of a nation. National well-being is embedded in the collective values and beliefs, concerning well-being, of a particular nation. This theory implies that well-being is constant over time, independent of actual national standards of living, and determined by a collective view of life (Van Hemert *et al.*, 2002).

The third theory of well-being, branded livability theory by Veenhoven and Ehrhardt (1995), claims that well-being is influenced by the objective standards of living. These standards of living are broadly defined, varying from education to income, equality, stability, and/or freedom (Van Hemert *et al.*, 2002). This theory suggests that well-being may be altered over time. Here follows an inclusive description of the three primary theories of well-being.

Comparison Theory:

This theory evaluates standards of living by weighting an individual's perception of their life against standards of how life ought to be (Lance *et al.,* 1995). Standards of comparison are thought to be variable and pursue perceptions of possibilities (Veenhoven & Ehrhardt, 1995). Thus, individuals evaluate their lives by what is believed life realistically could be. What life indeed could be is inferred by either observation of others or by past personal experiences (Lance *et al.,* 1995). Consequently, raising the standard of living in a particular nation would result in higher individual standards and vice versa. Standards follow success and thus, the variation between standards and current achievements remains constant in the long run (Veenhoven & Ehrhardt, 1995). Upward revision of aspirations results from rising social standards i.e. keeping up with the Jones's. Consequently, individual well-being is unrelated to the objective quality of life.

There are two key variants of this theory: "social-comparison" and "lifetime-comparison" (Veenhoven & Ehrhardt, 1995). The social-comparison variant focuses on comparisons with other individuals. It states that individuals will be unsatisfied with life, despite good standards of living, if comparisons are made with those whose standards of living are even higher. Similarly, individuals are thought to be satisfied with life despite averse conditions if comparisons are made with those who find themselves in worse circumstances (Veenhoven & Ehrhardt, 1995).

The lifetime-comparison variant assumes that individuals evaluate their lives in the cognitive context of their best and worst experiences (Veenhoven & Ehrhardt, 1995). This variant states that individuals will be unsatisfied with life despite good conditions if they formerly experienced even better conditions. Conversely, individuals are satisfied with life despite averse conditions if they experienced worse conditions in the past (Veenhoven & Ehrhardt, 1995). In both the social-comparison and lifetime-comparison variants relative deprivation determines well-being instead of absolute deprivation (Veenhoven & Ehrhardt, 1995).

When evaluating the comparison theory of well-being, Hagerty (2000) finds that a more positively skewed distribution of aggregate national income is related with lower well-being. Relating to lifetime comparisons, Easterlin (1995) discourses evidence of

a positive correlation between well-being and economic growth. However, both Diener *et al.,* (1993) and Veenhoven and Ehrhardt (1995) do not find any support that well-being is dependent on social or lifetime comparisons.

Folklore Theory:

In this theory, well-being is not thought to be an individual assessment of life but a reflection of the general concepts of life held by citizens within a nation (Van Hemert *et al.,* 2002). These concepts are thought to originate in tradition and not in present realities of life (Veenhoven & Ehrhardt, 1995). The core of this theory is that collective national beliefs and values form individual assessments of life. Inglehart (1990: 30) states "*that the culture component of these differences reflects the distinctive historical experience of the respective nationalities. Long periods of disappointed expectations give rise to cynical attitudes. These orientations may be transmitted from generation to generation through pre-adult socialization*".

Some cultures and nations are thought to be predisposed to a pessimistic view on life, while others are believed to foster an optimistic outlook (Veenhoven, 1994). Subsequently, well-being is primarily unrelated to the current standards of living within nations. If in a particular nation, previous generations have experienced much hardship, the resulting negative view on life will prolong into later generations despite standards of living having significantly improved. Inglehart (1990) names France and Italy to be examples of this. Conversely, a culture of optimism results in high national well-being levels, despite actual living conditions. Here, Ostroot and Snyder (1985) name the United States as an example.

When evaluating the folklore theory of well-being Van Hemert *et al.,* (2002) identify that cross-national differences in subjective well-being can be explained by folklore theory. Veenhoven (1994) however, is not able to confirm this theory in a country-level analysis. Veenhoven (1994) reports well-being to fluctuate over time, and as being dependent on living conditions. Further, Veenhoven (1994) finds neither moral appreciation of life nor cynical attitudes to be correlated with well-being across nations. Veenhoven (1994) predicts a negative relationship between well-being and Calvinism which is "*often said to breed unhappiness, because of its gloomy outlook on the future and its moral rejection of lust*" (Veenhoven, 1994: 132). However,

Veenhoven (1994) shows that Calvinism does not have a negative relation with well-being, inferring that cross-cultural variances cannot be clarified by differences between country's shared outlook on life.

Livability Theory:

This theory assumes that well-being primarily depends on the objective quality of life (Veenhoven & Ehrhardt, 1995). Thus, higher national living conditions result in higher levels of well-being within a particular nation. Individuals are believed to be satisfied with life when experiencing high living-conditions despite the knowledge that others are enjoying even better conditions. The livability of an individual's society is determined by how well society's collective provisions and demands fit with individual needs and capacities (Veenhoven & Ehrhardt, 1995). Livability theory views societies as collective arrangements that provide for universal human needs.

Primarily, subjective well-being is found to be contingent on absolute (objective) standards of living (Diener *et al*., 1993; Veenhoven & Ehrhardt, 1995). These findings support the livability theory of well-being. Van Hemert *et al.,* (2002) identify that cross-national differences in subjective well-being can be explained by livability theory. Arrindell *et al.,* (1997) relate national scores of subjective well-being to several country-level characteristics. Arrindell *et al.,* (1997) report greater subjective well-being in wealthy nations with high levels of civil rights. Diener *et al*., (1995) find a positive relationship, in 55 countries, between well-being and numerous economic and political variables and a number of other variables relating to equality and individualism.

Comparable results are found by Veenhoven (1999) who examines well-being in 43 nations. Veenhoven (1999) also finds a correlation between well-being and education and variables relating to media availability. A positive relationship between well-being and stability of democracy, and to a lesser degree level of democracy, are also found in the literature (Inglehart, 1997; Inglehart & Klingemann, 2000). Additionally, a strong correlation ($r = 0.74$; $p<0.01$) is reported between well-being and wealth (Inglehart, 1997). At the individual level, numerous studies report a positive correlation between well-being and firstly, socioeconomic status (Gibbs, 1985) and secondly, educational levels (Oliver & Burkham, 1979). These studies conform with

the livability theory of well-being as according to this theory well-being pertains to economic well-being, as well as educational and political stability.

2.1.3.1: Comparison of the Various Theories of Well-Being

Livability theory stresses the significance of objective living conditions and states that individuals make judgments on their well-being based on absolute standards, namely the level of which universal human needs are being met (Veenhoven & Ehrhardt, 1995). Livability theory predicts a clear relationship between well-being and national or individual income. Higher income results in higher well-being. However, this theory's predicted implication of social position on well-being is not clear cut. Intuitively, this theory seems to suggest that well-being must be greater for individuals at the top of the social ladder as living circumstances are superior in the top positions (Saris *et al.,* 1996). This is only accurate if life is indeed better for individuals living at the top instead of the bottom of the ladder (Saris *et al.,* 1996). If it is simply an issue of social prestige, being in the highest positions will have a rather modest effect on well-being (Saris *et al.,* 1996). Note here that social comparison theory is concerned with perceived advantage, while liveability theory focuses on actual advantage (Saris *et al.,* 1996). Actual well-being may be lower at the top of the social ladder resulting, for example, from the stresses involved in maintaining one's status or long working hours (Saris *et al.,* 1996).

Contradicting this, comparison theory focuses on relative living conditions and states that individuals make judgments on their well-being based on relative standards (Veenhoven & Ehrhardt, 1995). Thus, individuals compare current standards of living to either past experiences or to those of other's (Lance *et al.,* 1995). Comparison theory of well-being assumes that individuals constantly compare life with ideas of how life could or ought to be (Saris *et al.,* 1996). The smaller the difference between reality and standards, the higher well-being one will possess (Saris *et al.,* 1996).

Intuitively comparison theory predicts that social comparison will result in a strong positive correlation between well-being and social position (Saris *et al.,* 1996). The superior one's position is alleged to be, relative to others, the more well-being one will possess (Saris *et al.,* 1996). This theory forecasts that the rich and well educated will have higher levels of well-being than the poor and low educated. However, when interpreting comparison theory in an alternative manner, this theory predicts that there will be little or no correlation between well-being and social position (Saris *et al.,*

1996). This occurs when standards adjust to reality (Saris *et al.,* 1996). For example one's material standards increase as one gets richer. Here, accomplishing a superior position will increase well-being, but only for a short period of time (Saris *et al.,* 1996). Well-being will decline as expectations grow.

Folklore theory states that cross-national variances in well-being may be clarified by a national trait (Van Hemert *et al.,* 2002). Thus, this theory states that an individual's well-being is predetermined as it originates in tradition and not in present realities of life (Veenhoven & Ehrhardt, 1995). Folklore theory perceives well-being as a matter of standard outlook, instead of the result of an evaluation (Saris *et al.,* 1996). Current views regulate how happy individuals are instead of economic growth, personal income or comparing oneself to others. Therefore, folklore theory predicts that well-being is not correlated to social position (Saris *et al.,* 1996). If a particular negative or positive outlook on life is present as a national character, all citizens in that nation will tend to have equal levels of well-being (Saris *et al.,* 1996). Consequently, differences in well-being can only occur if social position is related with subcultural disparities in outlook (Saris *et al.,* 1996).

These various theories of well-being differ in both predictions (concerning who in society will possess the highest well-being) and assumptions (relating to what information individuals use when evaluating their lives). Which theory governments believe to be credible may significantly influence the standard of living in their nation. If policy makers believe that comparison or folklore theory is accurate, then governments are unable to affect the well-being levels of citizens. When governments improve the objective quality of life, citizens will either adapt to the new level (comparison theory) or well-being levels have already been predetermined in traditions and cannot be altered (folklore theory). However, if policy makers believe livability theory to be accurate, then governments have the ability to enhance individual well-being, by improving the objective quality of citizen's lives.

2.1.4: Well-Being and Utility Theory

The theory of utility has long been studied by economists (Gerdtham & Johannesson, 2001). Utility theory originates from sixteenth and seventeenth century writings of the philosopher Bentham (Stark & Bentham, 1952). Bentham (1879) conceptualises utility as a measure of happiness or pleasure and argues that utility is a measurable cardinal amount that can be compared between individuals. Bentham (1879) states that society's objective should be to maximise aggregate utility. Thus, society should aim for the greatest well-being for the greatest number of individuals.

Bentham's (1879) view of utility prevailed until the beginning of the 20th century. After which Pareto and Politique (1909) revealed that demand theory can only be derived from information on the ranking of various alternatives. This resulted in the ordinal utility theory, where utility merely refers to a preference ordering of different alternatives. Here utility is unable to be compared between individuals. The theory of ordinal utility became the prevailing view of neoclassical economics, and is still thought by most economists today (Gerdtham & Johannesson, 2001).

Neoclassical economics inferres individual utility, obtained from goods and services, from preferences revealed by the individual's market behaviour (Dolan *et al.*, 2008). Utility theory presumes that individuals are rational, fully informed, utility maximising and insatiable consumers, always favouring more over less (Dolan *et al.*, 2008) and therefore, higher income results in higher well-being. Thus, neoclassical economists traditionally derive utility purely from absolute income as arbitrated by consumer preferences and choice (Graham, 2005). In other words, the degree of individual preferences that are fulfilled is directly correlated with individual utility within a rational individual's monetary budget constraint. Utility theory offers an outline when evaluating various choices made by individuals (Frey & Stutzer, 2000b). Utility refers to the well-being that every choice gives to a particular individual and thus, utility theory assumes that evey decision is reached on the basis of the utility maximisation principle. The utility maximisation principal states that individuals should choose the choice that provides the highest utility or well-being (Frey & Stutzer, 2000b). Utility theory presumes that individuals are rational and therfore will

choose the optimal alternative that maximises utility (Aleskerov *et al.,* 2007). This idea originates from Bentham (1879).

According to this utility maximisation principle the best choice is always the one that gives the most utility to the decision maker. This notion beleves that an individual's utility depends on the basket of goods and services consumed. Thus, individuals living in rich, developed nations should be happier than individuals in poor developing nations. However, the pioneering study by Easterlin (1974) reveals that average levels of happiness are fairly constant across nations. Thus, individuals living in rich and poor nations report equal happiness. This finding has resulted in debates concerning the correlation between well-being and income, within economic literature, since the 1970s (Ferrer-i-Carbonell, 2005). Numerous explanations for the constant, across nation, well-being levels have been suggested within this literature.

The most prevalent explanation is that of relative income (Clark *et al.*, 2008). This justification reasons that individuals are not simply concerned with their absolute income but also with their income relative to the income of others. Alternatively, the modified Easterlin hypothesis states that upon obtaining a particular income level, enabling the consumption of basic needs, raising income further no longer results in greater well-being. Furthermore, economic growth and market capitalism has increased inequality within most nations (Freeman, 2011). Numerous economic empirical studies claim that an increase in income inequality results in a decline in average well-being levels. Similarly behavioural economics literature has found that individuals frequently make choices that slightly compromise their own well-being and consequently, depart from the typical model of the rational economic agent (Kahneman & Krueger, 2006). If indeed, people display limited rationality when maximizing utility, then choices made do not essentially reflect individual's true preferences. Due to this, economists have become progressively apprehensive when concerning the neoclassical preference theory when measuring utility (Frey & Stutzer, 2003).

In recent years several economists have deliberated over unconventional ways of measuring utility (Dolan *et al.,* 2008). The economics of well-being combines techniques from economics and psychology when assessing well-being and reports a

more extensive concept of utility than does conventional economics (Graham, 2008). The economics of well-being departs from the "decision utility" method of revealed preferences and measures an individual's well-being as a subjective overall evaluation of one's life (Frey & Stutzer, 2000b). Empirical analyses which concern themselves with well-being, instead of originating utility from income and price data, ask individuals directly about their life satisfaction or happiness. Research finds that self reported subjective well-being is a satisfactory empirical approximation of individual utility (Frey & Stutzer, 2005). Indeed well-being surveys are reported to measure utility. As stated by Frey and Stutzer (2010: 43) "*Utility can and should be cardinally measured in the form of subjective well-being*".

2.1.5: Well-Being Data - An Overview

Economists typically infer preferences from observed individual choices (Bruni & Porta, 2007). Thus, economists traditionally monitor what people do instead of listen to what people say. Well-being research departs from this custom. Indeed, well-being researchers are primarily concerned with self-reported levels of happiness and life satisfaction. These self-reported measures, which have been widespread within psychology, have been recently adopted by economists (Graham, 2005). Indeed subjective well-being data, on happiness or life satisfaction, is now used by economic literature to proxy individual utility (Ferrer-i-Carbonell & Ramos, 2014).

Through the analysis of these self-reported measures of well-being economists have attained significant insight into the determinants of individual well-being. Surveys that measure well-being often acquire data by asking respondents questions similar to the following: "*On the whole are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead*?" (The Euro-Barometer Survey Series); "*Taken all together, how happy would you say you are: very happy, quite happy, not very happy, not at all happy*?" (The World Values Survey); "*Taken all together, how would you say things are these days? Would you say that you are very happy, pretty happy, or not too happy*?" (General Social Survey); or "*All things considered, how satisfied are you with your life as a whole these days*?" (The World Values Survey). The above questions are normally clustered under the rubric of "*subjective well-being*" (Diener, 2006: 399-400).

These well-being questions provide data on subjective well-being evaluations where each individual rates their own well-being (Easterlin, 1974). Therefore, every individual is thought to be the best judge of their own well-being as well as possessing a frame of reference which defines the well-being range from "dissatisfied" to "satisfied" or "not at all happy" to "happy" (Easterlin, 1974). An individual's subjective well-being evaluation, reflects his/her current position, inside that subjective well-being frame of reference (Easterlin, 1974).

The legitimacy of these self-reported well-being measures remain questioned (Stevenson & Wolfers, 2008). The first reported issue stems from the stability of well-

being responses. Well-being may be seen as extremely volatile (Easterlin, 1974). Robinson and Shaver (1969) test whether subjective well-being responses fluctuate with the highs and lows of daily life. This was achieved by comparing well-being responses of two surveys of the American Institute of Public Opinion which were conducted within two weeks of each other. The well-being results, between the two surveys, were essentially indistinguishable. A final poll conducted after six months also depicted very little variations in the well-being data (Robinson & Shaver, 1969). Diener and Tov (2007) also identify a high test-retest well-being correlation. These results indicate that subjective well-being data is a precise measure of actual well-being (Sacks *et al.,* 2010).

A second reported issue with subjective measures of well-being is a question of validity or whether individuals are accurately able to assess their emotional state. Numerous empirical findings show a consistent correlation between subjective well-being answers and objective measures of well-being. These objective measures include time spent smiling or other alterations in facial muscles while being interviewed (Sandvik *et al.,* 1993), objective health measurements (Blanchflower & Oswald, 2008) and physical measurements of brain activity (Urry *et al.,* 2004). Diener (1984) identifies a positive correlation between subjective well-being responses and various physical evidence of well-being including smiling, laughing, heart rate measurements, sociability and brain electrical activities.

Other studies including Diener *et al.,* (2006) and Kahneman and Krueger (2006) find a positive correlation between subjective well-being responses and various alternative well-being assessments including friend's independent assessments, self-reported levels of health, sleep quality and personality. Correlations, in the assumed direction, have also been found between self-reported measures of well-being and changes in life circumstances. Helliwell (2003) and Clark and Oswald (1994), for example, report that marriage has a positive effect on an individual's subjective well-being. Emerging literature also links individual's behaviour to their self-reported well-being level. If individuals embark in behaviour that will maximize individual utility, and subjective well-being is an adequate proxy for utility, then well-being should correlate with behaviour (Ferrer-i-Carbonell & Ramos, 2014). The limited literature in this area finds evidence suggesting that individuals discontinue carrying out activities that yield low

well-being levels. Clark (2001) states that job satisfaction can forecast forthcoming job quits. Guven *et al.*, (2010) identify that the probability of a couple divorcing may be explained by the satisfaction gap which exists between spouses.

A third reported issue with subjective measures of well-being is whether individuals are willing to report accurate or indeed, willing to disclose information on questions as personal as well-being levels. As stated previously the consistency between self-reported well-being levels and other's well-being evaluations suggest that individuals are willing to report accurate measures of well-being. Survey evidence also illustrates that respondents are willing to answer well-being questions. In the 1998 General Social Survey, less than 1% of respondents did not provide an answer or answered "don't know" for the life satisfaction question whilst 17% of respondents did not disclose information about their earnings. In the EVS 2008 integrated data 97% of interviewees determined what happiness category they fell into and 99% of individuals reported their life satisfaction level.

A forth reported issue, with subjective measures of well-being, is concerned with the comparability of well-being levels between nations which differ extensively in cultural characteristics and also in the translation of surveys. Numerous researchers report a biologically based number of emotions which are universal to all individuals and cultures (Tov & Diener, 2013). The universal recognition of various emotions in others include anger, sadness and joy (Ekman & Friesen, 1971; Ekman *et al.*, 1987). Studies also find that individuals around the world report uniform requirements for greater well-being. Reported requirements primarily include money, health and family (Stevenson & Wolfers, 2008). Tov and Diener (2013) state that these, biologically grounded universal emotions, enable well-being measurements to be compared across nations.

To conclude self-reported measures of well-being appear to be adequate indicators of individual happiness and life satisfaction (Dolan & White, 2007). Extensive research has identified that individuals are able to consistently evaluate their own state of well-being (Frey & Stutzer, 2003). Indeed, self-reported measures have been identified as the best indicator of individual well-being (Frey & Stutzer, 2003). Additionally, subjective well-being data on happiness or life satisfaction is used to proxy individual

utility. When using data from well-being questions as a proxy measure of utility, two primary assumptions are imposed: Firstly individuals are capable and willing to answer well-being questions in a meaningful manner so that the answers are a positive monotonic transformation of utility; Secondly individual's well-being answers can be compared in a meaningful manner. Empirical research confirming these two assumptions is plentiful and may be found in various
disciplines (Ferrer-i-Carbonell & Ramos, 2014).

2.2: Well-Being and Absolute, Reference and Relative Income - Literature Review Introduction

Easterlin (1974) established the economics of well-being in the 1970s. Easterlin (1974; 1995; 2001) identifies that well-being levels across individuals inside a specific nation vary directly with income. Nevertheless, national income surges do not cause greater national well-being levels (Easterlin, 1974). The Easterlin paradox refers to this inconsistency. Easterlin's finding was confirmed by successive studies grounded on within nation well-being-income data. Diversely, studies centred on across nation well-being-income data display mixed results (Stevenson & Wolfers, 2008).

Many clarifications for the conflicting, within and across nation, results have been suggested. Easterlin (1974) states that these apparent inconsistent findings show consistency with the hypothesis that relative income is far more significant than absolute income when determining individual well-being levels. Numerous empirical results report that well-being is determined by the discrepancy between absolute and relative income (Senik, 2004). The theory of relative income stipulates that a person's well-being is contingent, not only on absolute income, but also on relative income. As specified by Easterlin *"happiness, or subjective well-being, varies directly with one's own income and inversely with the incomes of others"* (Easterlin, 1995: 36). In this quote "others" constitutes a reference group.

If national economic activity grows, individual incomes and reference incomes rise at comparable rates causing little or no variation amongst the two and therefore, aggregate well-being levels stay constant. The effect of relative income on well-being has meanwhile been studied by a number of economists (Dolan *et al.*, 2008). Easterlin (1974) concludes that economic growth will not advance the human condition, as despite society's prosperity in absolute terms, the frequency with which individuals encounter relative deprivation will remain mostly constant. Easterlin's theory has since been replicated by several subsequent studies.

2.2.1: National Cross-Sectional Comparisons of Well-Being and Income

Easterlin (1974) asks "*Does greater happiness go with higher income*?" (Easterlin, 1974: 99) and identifies that rich individuals possess greater well-being than poor individuals when examining within-country cross-sectional data. This claim was derived from a cross tabulation of the well-being-income relationship (illustrated in Table 2.2.1). This table depicts the percentage distribution of the US population by happiness and size of income.

Table 2.2.1: Happiness and Individual Income

PERCENTAGE DISTRIBUTION OF POPULATION BY HAPPINESS, BY SIZE OF INCOME,

UNITED STATES, 1970 [a,b]

Income (in $1,000)	(1) Very happy	(2) Fairly happy	(3) Not very happy	(4) No answer
All classes	43	48	6	3
15 +	56	37	4	3
10-15	49	46	3	2
7-10	47	46	5	2
5-7	38	52	7	3
3-5	33	54	7	6
Under 3	29	55	13	3

[a] Data from AIPO Poll of December 1970

[b] N = 1517

(Source: Easterlin, 1974: 100)

Easterlin (1974) presents the above data obtained from an American survey conducted in December 1970. Just over one fourth of individuals, in the lowest income group, report a well-being level of "very happy". Whereas, almost twice as many individuals in the highest income group report that they are "very happy". Indeed, individuals in successive income groups, from low to high, reporting themselves as "very happy" rises steadily with each increase in income. Easterlin (1974) states that this finding clearly indicates a positive association between happiness and individual income.

Since Easterlin's (1974) study numerous economists have studied the within country relationship between individual well-being and income. A clear consensus has emerged in the literature (Stevenson & Wolfers, 2008). This consensus states that regressions of well-being on income, using cross-sectional survey data from a particular nation (including or excluding standard demographic controls), reveal significant positive income coefficient estimates. Therefore, within a particular nation richer individuals report higher levels of well-being than poorer individuals. No literature has been identified that contradicts this positive relationship. As stated by Easterlin (2001: 468) "*in every representative national survey ever done a significant bivariate relationship between happiness and income has been found*".

This positive relationship is revealed in both developed (Easterlin, 1995; 2001; Shields & Price, 2005) and developing (Graham & Pettinato, 2002; Lelkes, 2006b) economies. A comprehensive list of economic research which concerns itself with the relationship between well-being and individual income, within a particular nation, is illustrated in Table A2.2.1 in the appendix. As displayed these studies all report a positive well-being-income gradient.

2.2.2: Well-Being and the Income Comparison Effect

Several reasons for the apparent contradictory, within and across country, results regarding the relationship between well-being and income have been proposed. Several economic studies find evidence of the income comparison effect where well-being may be associated with comparing one's income with that of one's peer group (Duesenberry, 1952; Easterlin, 1974; Frank, 1997; Blanchflower & Oswald, 2004a; Vendrik & Woltjer, 2007).

Duesenberry (1952) states that individual utility, obtained from one's consumption, is a function of the ratio of one's current expenditure to that of other individual's. Thus, individual utility is not solely a function of the absolute level of one's expenditure. Duesenberry (1952) illustrates the following equation:

$$U_i = f\left[\frac{C_i}{\sum a_{ij} C_j}\right] \qquad \textbf{(2.2.2)}$$

Where:

U_i = the utility index of individual *i*
C_i = the consumption expenditure of individual *i*
a_{ij} = the weight applied by consumer *i* to the expenditure of consumer *j*
C_j = the consumption expenditure of individual *j*

Equation 2.2.2 from Duesenberry (1952) states that one's utility depends on the ratio of one's consumption expenditure compared to the national per capita average. The higher above average an individual's consumption is the greater well-being they will possess. Therefore, an increase in one's income will increase individual well-being but also raise the average income of all individuals and consequently aggregate societal well-being will be unchanged (Easterlin, 2001).

The question concerning the significance of others for individual utility and consumption choices dates back to the origin of modern utility and consumption theory (Ferrer-i-Carbonell, 2005). In the early 20th century, Veblen (1909) argues that a shortcoming in the marginal utility school is its failure to account for the substantial importance of human interactions and interdependence for individual decision

making. In the mid-20th century the effect of other's consumption on individual utility was highlighted. For example, the consumption of diamonds is not solely dependent on the diamonds themselves but also on the societal status of the diamonds (Stigler, 1950). Veblen (1909: 632) explains this concept by stating that precious stones are more esteemed than they would be if they were more plentiful and cheaper. Other economists of the 20th century who consider this income comparison effect are Clark (1918) and Knight (1922).

At the end of the 20th century Leibenstein (1950) argues that well-being is not merely obtained from consuming a product itself (functional demand) but also from various other features relating to the consumption of the product (non-functional demand). Included in the non-functional demand is what is labelled as the "Bandwagon effect" (Leibenstein, 1950). This is when an individual consumes a product because many other individuals in society do so. In this situation, purchasing the product serves the purpose of belonging to society.

Studies including Frank (1985a), Kapteyn (1977), Kapteyn *et al.,* (1978), Holländer (2001), Childers and Rao (1992), Bearden and Etzel (1982), Falk and Knell (2000) and Frank (1985b) agree that individual consumption is partially determined by other individual's consumption. Consumption decisions partly result from copying others and complying with social standards. Thus, this concept states that consumption results in a negative externality by reducing the well-being of other's (Layard, 1980; Frank, 1989).

The income comparison effect results in individual well-being depending on what one consumes in comparison with others. If everyone in a particular society drives a Rolls Royce, one would be unsatisfied with an Audi. Consequently, increasing the incomes of all does not raise the well-being of all (Easterlin, 1995). This results as the positive effect of higher income on individual well-being is offset by the negative effect of advanced living level norms brought about by the increase in incomes generally (Easterlin, 1995). When national economic activity increases, individual income and reference income increase at comparable rates resulting in little or no variation amongst the two and thus, individual's well-being levels remain constant. Therefore,

individual well-being depends not simply on absolute income but also on relative and reference income.

Relative income is the distance between one's own income to the income of a reference group (Ferrer-i-Carbonell, 2005). Relative income is expected to have a positive impact on well-being as the richer an individual is compared with others the more satisfied he/she will be. Reference income is the average income of one's reference group (Ferrer-i-Carbonell, 2005). Reference income is believed to be negatively correlated with individual well-being as the higher the average income of a reference group is the less satisfied individuals are with their own income. What follows in Subsection 2.2.2.1 is a review of existing literature of relative and reference income on well-being.

2.2.2.1: Well-Being, Relative and Reference Income

Relative Income

Numerous empirical results report that well-being is determined by the discrepancy between absolute and relative income (Senik, 2004). As stated by Easterlin (1995: 36) "*happiness, or subjective well-being, varies directly with one's own income and inversely with the incomes of others"*. What Easterlin (1995) refers to here as "others" constitutes a reference group. Therefore, an increase in individual income results in a positive effect on individual well-being. However, an increase in relative income results in a negative effect on individual well-being. This results as now the individual in question is relatively poorer despite their absolute income remaining constant. In 1849 Karl Marx explains this concept as follows: "*A house may be large or small; as long as the surrounding houses are equally small it satisfies all social demands for a dwelling. But if a palace rises beside the little house, the little house shrinks into a hut*" (quoted in Easterlin, 1974: 111). The effect of relative income on well-being has since been studied by a number of economists (Dolan *et al.*, 2008). Easterlin's findings on relative income have been confirmed by Clark and Oswald (1996), Luttmer (2005), Dynan and Ravina (2007), Ferrer-i-Carbonell (2005) and Caporale *et al*., (2009).

Luttmer (2005) studies the effect of relative possession or if having less than your neighbour diminishes happiness. Luttmer (2005) matches individual-level panel data, which incorporates several indicators of happiness, with local average income. Luttmer (2005) identifies that when individual's own income is controlled for, neighbours having a higher income is associated with reduced levels of self-reported happiness. Indeed the absolute size of the negative effect of neighbours experiencing an increase in income is on par with the positive effect of a comparable raise in one's own income.

Dynan and Ravina (2007) using the happiness variable from the General Social Survey study report happiness levels for various socioeconomic groups. Dynan and Ravina (2007) aim to determine whether happiness levels are altered by the changing relative position of these groups within the income distribution. Dynan and Ravina (2007) identify that happiness is higher among those individuals with higher income relative to their neighbours. This remains even after controlling for own income. Dynan and

Ravina (2007) also report that this relationship is much stronger for individuals whose socioeconomic group has above-average income than those whose group has below-average income. Dynan and Ravina (2007) conclude that their findings indicate that people only become concerned with relative comparisons after a certain level of income is attained.

Ferrer-i-Carbonell (2005) conducts an empirical analysis of the effect of comparison income on individual life satisfaction. In this study various hypotheses (including the impact of own income, reference group income, the difference between one's own income and that of the reference group and the asymmetry of comparisons) are tested. Ferrer-i-Carbonell (2005) defines relative income as the distance between the individual's own income and the reference group income. Ferrer-i-Carbonell (2005) reports a positive relative income impact on well-being. Thus, the richer individuals are compared to their reference group the happier they will be.

Reference Income

Few economic empirical analyses, when focusing on well-being and income, account for reference group income. Studies which do so include Clark and Oswald (1996), Kapteyn *et al.,* (1997), Van de Stadt *et al.,* (1985), McBride (2001) and Ferrer-i-Carbonell (2005). These studies all conduct an empirical analysis of the importance of reference income on individual well-being. All studies report reference group income as having a negative effect on individual well-being.

Kapteyn *et al.,* (1978:177) refers to this negative relationship as "*reference drift effect*". Clark and Oswald (1996) identify a negative reference group income effect on individual job satisfaction. Therefore, Clark and Oswald (1996) analyse the reference income effect on job-utility. The empirical analysis of McBride (2001) tests the relationship between individual income, past financial position, and cohort (reference) income on self-reported happiness. Past financial position is defined as one's subjective belief as to whether one is better-off or worse-off than one's parents. McBride (2001) using subjective self-reported well-being data, finds a negative relationship between individual well-being and both reference group income and parent's past financial situation. Thus, higher peer income results in lower individual well-being. The empirical analysis of Ferrer-i-Carbonell (2005) presents the effect of

comparison income on individual life satisfaction. Thus, Ferrer-i-Carbonell (2005) examines the influence of reference group income on individual life satisfaction. Ferrer-i-Carbonell (2005) states that reference group income is approximately as important as own income for individual life satisfaction.

2.2.3: Well-Being and Other Socio Economic Variables

Variations in income levels explain merely a low proportion of the variations in well-being levels among individuals. Easterlin (2001: 468) reports the simple correlation in the United States as being 0.20. This low correlation coefficient indicates that other economic and non-economic variables affect individual well-being levels. What follows, in this sub section, is a literature review of a number of other key personal and socio-economic determinants of well-being. These include employment status, religion, health, age, gender and marital status.

Well-Being and Employment Status

Duarte *et al.,* (2007) state that employment status may have diverse effects on individual well-being. Firstly, employment may result in greater well-being due to factors such as social interaction, learning and self-worth (Duarte *et al.,* 2007). Shields and Wailoo (2002: 447) state that "*Having a job also provides a structure to the day gives a sense of purpose and fosters networks of social interaction*." Secondly, employment may result in reduced well-being due to issues such as increased stress, which may reduce mental health, balancing work and family life and insecurity (Duarte *et al.,* 2007). Lastly, unemployment may result in reduced well-being due to a loss of income or felling shame, despair or worthlessness (Duarte *et al.,* 2007).

Literature from various nations and time periods, from cross sectional and longitudinal data, find that individual well-being and unemployment predominantly records a significant negative correlation. This relationship holds even when the unemployed have the same level of income (Clark & Oswald, 1994; Frey & Stutzer, 1999; Winkelmann & Winkelmann, 1998). Several studies including Stutzer (2004), Di Tella *et al*., (2001), Korpi (1997), Frey and Stutzer (2000a) and Helliwell (2003) all derive well-being as a continuous variable and report that the unemployed possess a five to fifteen percent reduced well-being score. Clark and Oswald (1994) find that unemployment results in greater losses to well-being than being divorced or separated. Winkelmann and Winkelmann (1998) identify that the negative effect of unemployment on life satisfaction is nearly three times larger than that of bad health. Helliwell (2003) states that unemployment reduces well-being by 0.61 on a ten-point life satisfaction scale. This negative correlation may partially result from reverse

causation, where individuals with low levels of well-being are more at risk of becoming unemployed due to reduced productivity, possessing lower levels of health and being more likely to select unemployment (Clark, 2003). However, Winkelmann and Winkelmann (1998) find that the primary causation runs from unemployment to life satisfaction.

While the empirical evidence concerning well-being and unemployment is clear the relationship between well-being and the quantity of hours worked is less direct. Data from Germany reports that well-being increases with hours worked (Meier & Stutzer, 2008). However, Blanchflower and Oswald (2004b) and Blanchflower and Oswald (2005) identify no difference between full-time and part-time work on well-being. Luttmer (2005) detects a negative relationship between the log of usual working hours and happiness using US data. Golden and Wiens-Tuers (2006) report that well-being increases as working hours increase. However this only happens up until a certain point after which well-being decreases as working hours increase (Golden & Wiens-Tuers, 2006).

Well-Being and Religion

Economic literature in this area reveals that beliefs affect individual well-being. Religious individuals (irrespective of faith) possess greater well-being than non-believers (Clark & Lelkes, 2005). It is debated whether this positive effect is due to the comfort provided by religious beliefs or to the social networks obtained by regular participation in church activities (Helliwell, 2003). The World Values Survey allows for the distinction between these two different effects. This data set not only asks respondents about their frequency of church attendance but also how important God is to their lives. Using this data set Helliwell (2003) identifies that both variables are positively related to overall life satisfaction. Individuals who report that God is "very important" in their lives report an average 0.34 higher life satisfaction measure (Helliwell, 2003).

Other studies which find a positive well-being-religion relationship includes Clark and Lelkes (2005), Helliwell and Putnam (2004) and Rehdanz and Maddison (2005). It has also been found that religion insures against some averse life events. Those who are religious suffer less from reduced well-being caused by unemployment and loss of

income than do the non-religious. Clark and Lelkes (2005) report that religious individual's life satisfaction levels, when experiencing these losses, decline as little as half as those from non-religious individuals. This study also states that religious individuals are less hurt by marital separation. However, divorce reduces life satisfaction levels of Catholics more than non-religious individuals.

Well-Being and Health

Being healthy increases well-being (Gerdtham & Johannesson, 2001; Borooah, 2006). Gerdtham and Johannesson (2001) find a 0.42 predicted probability of being satisfied "most of the time" if one has bad health and a predicted probability of 0.60 if one reports good health. Lelkes (2006a) identifies health as being a major component of individual life satisfaction. Bad health reduces the probability of individuals reporting themselves as "very satisfied" by 29 percent. The analogous effect for unemployment is 19 percent and for high income 17 percent (Lelkes, 2006a).

Helliwell (2003) reports health as the most significant explanatory variable of life satisfaction. A one-point increase in health is associated with a 0.61 point enhancement of individual life satisfaction. Likewise, Borooah (2006) reports health as being the most important variable for happiness in 80 nations worldwide. Moreover, Borooah (2006) reveals that improving one's health is expected to increase the probability of reporting the highest happiness category by 15.3 percentage points.

The correlation between well-being and health depicts a strong positive relationship for both physical and psychological health (Clark & Oswald, 2002). However, psychological health is found to have a stronger correlation with well-being than physical health (Dolan *et al.,* 2008). Some of the association may be due to reverse causation where greater well-being results in greater health. However, the recorded effect size of the health variable, in many economic studies, is substantial indicating that when controlling for the impact that well-being has on health, health still impacts well-being (Dolan *et al.,* 2008).

Well-Being and Age

Empirical analysis consistently report a negative relationship between well-being and age and a positive relationship between well-being and age squared (Blanchflower &

Oswald, 2004a; Ferrer-i-Carbonell & Gowdy, 2007). Studies primarily report that well-being is U-shaped in age (Clark & Oswald, 1994; Gerdtham & Johannesson, 2001; Helliwell, 2003; Helliwell & Putnam, 2004). This U-shaped curve demonstrates that younger and older individuals possess the highest well-being levels. The lowest well-being levels occur in middle age. Depending on which study is focused on middle age is anything between 32 and 50 years of age.

Well-Being and Gender

Women are found to report greater well-being then men (Alesina *et al.,* 2004). However, when examining specific subsets, including individuals who cannot work because of health issues (Oswald & Powdthavee, 2008) or individuals who are informal carers for others (van den Berg & Ferrer-i-Carbonell, 2007), the gender effect frequently disappears. Blanchflower and Owald (2004a) discovered curious patterns for the gender variable in their subjective well-being regressions for the United States and Europe. Regardless of anti-discrimination policies for women, well-being did not systematically increase across time as would be expected. At a particular point in time however, women report greater subjective well-being levels then men (Blanchflower & Oswald, 2004a; Alesina *et al*., 2004). Conversely, mental distress, another measure of subjective well-being, was found disproportionally among women (Clark & Oswald, 1994). These contradictory findings suggest that other correlates may be more important in determining subjective well-being (Dolan *et al.*, 2008). It is found that being unemployed negatively affects both men and women, but the magnitude is more sever for men (Clark, 2003).

Well-Being and Marital Status

Generally, individuals not in any relationship have lower well-being than those in a relationship (Dolan *et al.,* 2008). Numerous economic studies find that marriage has a positive effect on well-being (Easterlin, 2003; Wilson & Oswald, 2005; Borooah, 2006; Stutzer & Frey, 2006). Clark and Oswald (2002) identify that being married brings the same amount of well-being as having an additional income of £70,000 per year. Regular sex is also shown to increase well-being (Blanchflower & Oswald, 2004b). In particular, well-being is increased with having only one sexual partner (Blanchflower & Oswald, 2004b). This highlights the positive effect on well-being of being in a caring relationship instead of being in numerous less secure relationships.

Despite some variations between studies, being married results in the greatest well-being levels. Separated individuals are identified as having the lowest levels of well-being, even lower than those divorced or widowed (Helliwell, 2003). Several studies consider gender differences and primarily show similar marital status effects on well-being for both genders (Frey & Stutzer, 2000b).

2.2.4: Happiness versus Life Satisfaction

Many studies, despite having two distinct meanings, use the term happiness and life satisfaction interchangeably (Gerdtham & Johannesson, 2001; Frey & Stutzer, 2000a; Ferrer-i-Carbonell, 2005). Indeed, much of the to-date economic literature use the "life satisfaction" and "happiness" variables interchangeably when evaluating subjective well-being. Justification in doing so primarily states the high correlation and similar covariates that these two measures of well-being possess (Stevenson & Wolfers, 2008).

Limited economic empirical work distinguishes between the different definitions of well-being. Studies that have concerned themselves with this issue have found distinctions between the two definitions. Stevenson and Wolfers (2008) claim that the happiness and life satisfaction variables capture somewhat different concepts. Stevenson and Wolfers (2008:4) describe happiness as being more "*related to affect*" whereas life satisfaction is more "*evaluative*". According to Helliwell (2003) data on happiness may indicate brief periods of joy and may be responsive to short-term circumstances. Life satisfaction data however, tends to depict an underlying state of well-being (Helliwell, 2003).

Deaton (2008) states that the life satisfaction and happiness variables are often interpreted as each other despite not being synonyms. Life satisfaction data reports respondent's overall evaluation of their own lives (Deaton, 2008). Happiness may be seen as relating to effect, and may be determined from experiential questions, such as whether the individual smiled, felt happy or had an absence of depression on the day before the interview. Helliwell and Putnam (2004: 1435) distinguishes both terms by conceptualising happiness as *"short-term, situation-dependent expressions of mood"* and life satisfaction as a *"longer-term, more stable evaluation"*. Thus, happiness is a short term, sporadic measure of well-being influenced by ones current situation whereas, life satisfaction is a long term stable measure of well-being influenced by ones overall situation.

Peiró (2006) empirical analysis, when determining the distinction between happiness and life satisfaction, finds that while non-economic conditions have a similar effect on

happiness and life satisfaction, economic conditions depict a different relationship. Peiró (2006) identifies unemployment as having a strong and negative relationship with life satisfaction, but not with happiness. Income is seen to depict a much stronger association with life satisfaction than with happiness. Peiró (2006) states that these findings differentiate happiness and life satisfaction as two distinct spheres of well-being: happiness is independent of economic factors while life satisfaction is conditioned by them. Peiró (2006) concludes that changes in economic conditions, such as employment or income, decisively affect life satisfaction, while having a much more limited effect on happiness levels.

Stevenson and Wolfers (2008) compare the estimates of the relationship between happiness and income and life satisfaction and income. Data from the 2008 wave of the World Values Survey is used when estimating both the happiness-GDP link and the life satisfaction-GDP link. Stevenson and Wolfers's (2008) results depict happiness as being somewhat less strongly correlated with GDP than life satisfaction. Subsequently, Stevenson and Wolfers (2008) state that this variation in results indicates that life satisfaction and happiness should not be used as synonymous.

Caporale *et al.,* (2009) empirical work reports slight differences in the size of the estimated coefficients between life satisfaction and happiness. The income coefficient in the happiness regression is lower than those in the life satisfaction regression. The being married coefficient is larger in the happiness regression than in the life satisfaction regression. Caporale *et al*., (2009: 11) rationalise happiness as being a "*broader concept*" than life satisfaction. The effects of economic factors on happiness are alleviated by the impact of factors affecting individual's well-being in the life domain (Caporale *et al*., 2009).

The above results indicate the importance of distinguishing between the two definitions of well-being. Those empirical studies who fail to do so may be obtaining incomplete results.

2.2.5: Methodological Issues and Empirical Approach

Numerous empirical issues arise when testing the significance of absolute, reference and relative income on individual well-being. These issues include which regression technique to apply and which regression form and empirical approach to adopt. These issues are discussed in the following subsections.

2.2.5.1: Regression Techniques

The term measurement refers to the assignment of different numbers or symbols to the various characteristics of variables in accordance with certain rules (Leech *et al.*, 2008). In any research different variables may be at different levels of measurement and thus, need to be quantified differently. The variable's level of measurement will determine the appropriate regression model needed for any analysis. Classically there are four levels of measurement defined by Stevens (1946) as nominal, ordinal, interval and ratio.

The measurement of the dependent well-being variables, happiness and life satisfaction, are regarded as being that of ordinal ranking (Ferrer-i-Carbonell & Frijters, 2004). Due to the happiness and life satisfaction variables being of an ordered nature, this subsection will concentrate on ordinal scale variables.

Ordinal Scale Variables

Ordered responses are a kind of multinomial response where the values assigned to the responses are not arbitrary (Wooldridge, 2010). Variables with ordinal levels of measurement are, as well as being mutually exclusive categories, ordered categories from low to high (Morgan *et al.,* 2012). Outcomes related with high levels of well-being are ranked higher than the outcomes associated with lower levels of well-being (Borooah, 2002). These responses are classified as ordered data because they follow a strict ordering based on the value of the underlying latent variable, well-being (Hilmer, 2001). However, the differences between the well-being responses are not uniform (Morgan *et al.,* 2012). Therefore, the four various happiness levels and 10 various life satisfaction levels possess a clear ranking as it is known which category is highest or more preferred on a dimension. However, the intervals between the various categories

are not precise or equal (Leech *et al.*, 2008). Thus, it is unknown if the difference between "not at all happy" and "not very happy" or between "quite happy" and "very happy" is the same. Thus, the ratio between the various well-being categories may not be measured (Gujarati, 2011) and have no cardinal significance (Borooah, 2002). Consequently, the actual values taken by the ordered dependent variable are irrelevant so long as larger values are associated with greater levels of well-being (Borooah, 2002).

The inherent ordered nature of outcomes have no implications for the differences in strength between the outcomes (Borooah, 2002). Regression techniques that fail to account for the ordered nature of the dependent variable may lead to less efficient estimates (Borooah, 2002). Therefore, well-being responses with ordered categories cannot be simply modelled using classical regressions. Ordinary linear regression is unsuitable due to the dependent variable's noninterval nature as the spacing of the outcome choices may not be assumed as uniform (Gujarati, 2011). Alternatively, although it is possible to use multinomial logit models, the ordinal nature of the dependent variable would not be accounted for. Therefore, such models would not use all of the available information regarding the particular variable being examined. Ordered logit and probit models are extensively used when analysing ordinal scale data (Maddala, 1983).

Ordered Logit and Probit Model

Ordered probit and ordered logit regressions are extremely similar. A primary assumption of both the probit and logit model is that of parallel slopes. If a variable which affects the likelihood of an individual being in a particular ordered category such as "very happy" ($y_i = 4$) exists, then it is presumed that the coefficient linking the variable to the various outcomes will be the same across outcomes (Borooah, 2002). Thus, an explanatory variable will affect the likelihood of an individual stating a happiness level of "very happy" exactly as it will affect the likelihood of them stating "not at all happy".

The difference between the ordered probit and ordered logit models originates in the distribution of the error term (Borooah, 2002). Firstly, an ordered logit model assumes that the error term is logistically distributed whereas the ordered probit model assumes

that error term is normally distributed (Borooah, 2002). Greene (2000) argues that the justification of one distribution over the other is problematic on theoretical grounds and in most applications it seems to not make much statistical difference (Greene, 2000). However, researchers commonly assume a normal distribution when the true distribution is unknown (Greene, 2000). Others state that if the probability distribution of the error term is unknown, the error should be assumed to follows a particular probability distribution (Borooah, 2002). This assumed distribution of the error term is the dissimilarity between the logit and probit model. The logistic distribution is comparable to the normal distribution except for the tails being substantially heavier (Greene, 2000). The normal distribution is used in numerous analyses (Greene, 2000) which has resulted in the ordered probit model commonly being used in analyses of discrete ordered responses (McKelvey & Zavoina, 1975).

The cumulative distribution function of a logistic distribution (Borooah, 2002; Greene, 2000) is clarified as follows:

$$Pr(X \leq x) = \Lambda(x) = \frac{e^{x}}{[1+ e^{x}]} = \frac{1}{(1 + e^{-x})} \qquad \textbf{(2.2.5.1a)}$$

The cumulative distribution of a standard normal variet (Borooah, 2002; Greene, 2000) is explained in the follows equation:

$$Pr(X < x) = \Phi(x) = \int_{1}^{x} \frac{1}{2\pi} e^{\frac{-x^2}{2}} dX \qquad \textbf{(2.2.5.1b)}$$

Numerous studies focusing on well-being determinants have explicitly used the ordered probit model in their econometric estimation of the well-being equation. These studies include Clark and Oswald (1994), Plug (1997), Ferrer-i-Carbonell (2005), Frey and Stutzer (1999; 2000a), Hartog and Oosterbeek (1998), Litchfield *et al.,* (2012), McBride (2001), Van Praag *et al.,* (2003) and Wottiez and Theeuwes (1998).

The Ordered Probit Model

The ordered probit model is based on a latent regression (Greene, 2000; Stewart, 2004) as follows:

$$y_i^* = \beta x_i' + \varepsilon_i \qquad For\ i = 1,\ldots, N \quad \textbf{(2.2.5.1c)}$$

Where:

y_i^*	=	unobserved underlying latent variable
β	=	vector of unknown parameters
x_i'	=	vector of observations on a set of explanatory variables
ε_i	=	random error tem with the distribution function in 2.2.5.1b

In well-being data individuals report a number on a scale from, for example 1 to 4 or 0 to 10, that represents their individual well-being (y*). However, the exact degree of an individual's well-being is challenging if not impossible to observe (Borooah, 2002). y_i^* itself is not observed, instead the observation variable y_i is discrete and takes on a value {0, 1, 2 ,…, J}. Individual well-being, is a *latent* variable (Frey & Stutzer, 2002a), which while conceptually useful is unobservable in either principal or practice (Stewart, 2004). The subjectivity of responses may be understood as being swept into the error term (Blanchflower & Oswald, 2001). If y_i^* was observed for all observations, β could be estimated by ordinary least squares without imposing a distributional assumption on the error term (Stewart, 2004). While a person's well-being cannot be directly observed, well-being indicated by answers to a life satisfaction or happiness survey question can be.

As stated by Greene (2000) the observed dependent variable y_i relates to the latent dependent variable y_i^* as follows:

$$\begin{aligned}
&y_i = 0 \qquad if \quad y_i^* \le 0 \\
&y_i = 1 \qquad if \quad 0 < y_i^* \le \mu_1 \\
&y_i = 2 \qquad if \quad \mu_1 < y_i^* \le \mu_2 \\
&\qquad\quad \bullet \\
&\qquad\quad \bullet \\
&\qquad\quad \bullet \\
&y_i = J \qquad if \quad \mu_{j-1} \le y_i^*
\end{aligned} \qquad \textbf{(2.2.5.1d)}$$

Where:

y_i = observed discrete dependent variable
y_i^* = unobserved latent dependent variable
μ_j = threshold parameters of cut-off points such that $\mu_1 < \mu_2 \cdots < \mu_{J-1}$

Therefore, the range of y_i^* is portioned into J mutually exclusive and exhaustive intervals and the variable y_i specifies the interval into which a particular observation falls (Greene, 2000). With a normal distribution the following properties hold:

$$Pr(y_i = j) = \begin{cases} Prob\ (y = 0|x) = \Phi(-x_i'\beta) \\ Prob\ (y = 1|x) = \Phi(\mu_1 - x_i'\beta) - \Phi(-x_i'\beta) \\ Prob\ (y = 2|x) = \Phi(\mu_2 - x_i'\beta) - \Phi(\mu_1 - x_i'\beta) \\ \vdots \\ Prob\ (y = J|x) = 1 - \Phi(\mu_{j-1} - x_i'\beta) \end{cases} \quad \textbf{(2.2.5.1e)}$$

Where:

Φ = cumulative normal distribution of ε_i

As stated by Stewart (2004) if the following notation is adopted where $_0 = -\infty$ and $\mu_J = +\infty$ then these can be rewritten more compactly as:

$$Pr[yi = j] = \Phi(\mu_j - x_i'\beta) - \Phi(\mu_{j-1} - x_i'\beta) \quad \textbf{(2.2.5.1f)}$$

This applies for all j.

A natural estimator for the ordered probit model is log likelihood (Stewart, 2004) presented as follows:

$$log\ L = \sum_{i=1}^{N} \sum_{j=1}^{J} y_{ij}\ log\ [\Phi(\mu_j - x_i'\beta) - \Phi(\mu_{j-1} - x_i'\beta)] \quad \textbf{(2.2.5.1g)}$$

Where:

Φ = cumulative normal distribution of ε_i

2.2.5.2: Regression Form and Empirical Approach

In order to test the various hypotheses regarding the influence of own income and peer group income on well-being the empirical analysis, of Ferrer-i-Carbonell (2005) is based on various specifications of equation (2.2.5.2). The subsequent relation is anticipated for each individual *i* at a particular (constant) time *t*.

$$WB = SWB\ (y, y_r\ , X) \qquad \textbf{(2.2.5.2)}$$

Where:

WB	=	the economic concept of welfare or well-being
y	=	absolute family income
y_r	=	reference group income
X	=	the vector of variables including individual and household socio-economic and demographic characteristics

The first specification is one which includes, in addition to *X*, merely family income as a determinant of subjective well-being (Ferrer-i-Carbonell, 2005). The collective theory in economics is a positive well-being family income (y) relationship (Easterlin, 2001). Frequently, the individual well-being function is thought to be concave in income and, subsequently, income is presented in logarithmic form (Deaton, 2008).

To test whether reference group income results in a negative effect on individual well-being the specification includes, in addition to *X*, family income and reference group income as determinants of subjective well-being (Ferrer-i-Carbonell, 2005). Reference income, y_r, is expected to have a negative correlation with individual well-being (Ferrer-i-Carbonell, 2005).

A third specification assumes that well-being depends on the distance between the individual's own and the reference group income. This is completed by including the difference between the logarithm of the own income and the logarithm of the average income of the reference group (Ferrer-i-Carbonell, 2005). Relative income is anticipated to have a positive impact on well-being (Caporale *et al*., 2009).

2.2.6: Section Conclusion

The understanding of the well-being-income relationship is underpinned by a vast quantity of economic literature. Easterlin (1974) pioneered the economics of well-being in the 1970s. Easterlin (1974; 1995; 2001) finds that well-being levels across individuals within a specified nation fluctuate directly with income. Indeed, a clear consensus has emerged within the literature (Stevenson & Wolfers, 2008). This consensus states that regressions of well-being on income, using cross-sectional survey data from a particular nation illustrate significant positive income coefficient estimates. Therefore, within a particular nation richer individuals report higher levels of well-being than poorer individuals. Diversely, Easterlin (1974) identifies that national income increases do not result in greater national well-being levels. However, subsequent studies based on across nation well-being and income data report mixed results (Stevenson & Wolfers, 2008).

Numerous explanations, for the apparent opposing, within and across nation, results have been suggested. Easterlin (1974) states that these contradicting results show consistency with the hypothesis that relative income is far more significant than absolute income when determining individual well-being levels. Relative income is the distance between one's own income to the income of a reference group (Ferrer-i-Carbonell, 2005). Numerous other empirical results find that well-being is determined by the discrepancy between absolute and relative income (Senik, 2004). This theory of relative income specifies that an individual's well-being depends not only on absolute income but also on relative income. When national economic activity increases, individual incomes and reference incomes increase at comparable rates resulting in little or no variation amongst the two and thus, aggregate well-being levels remain constant.

Numerous economists have studied the within country relationship between individual well-being and income. A clear consensus has emerged in the literature (Stevenson & Wolfers, 2008). This consensus states that regressions of well-being on income, using cross-sectional survey data from a particular nation, reveal significant positive income coefficient estimates. Therefore, within a particular nation richer individuals report

higher levels of well-being than poorer individuals. No literature has been identified that contradicts this positive relationship.

Few economic empirical analyses, when focusing on well-being and income, account for reference group income. Studies which do so include Clark and Oswald (1996), Kapteyn *et al.,* (1997), Van de Stadt *et al.,* (1985), McBride (2001) and Ferrer-i-Carbonell (2005). These studies all report reference group income as having a negative effect on individual well-being. The effect of relative income on well-being has been studied by a number of economists (Dolan *et al.,* 2008). Findings report a positive relative income impact on well-being. Thus, the richer individuals are compared to their reference group the happier they will be.

Numerous empirical issues arise when testing the importance of absolute, reference and relative income on individual well-being. These issues include which regression form and empirical approach to adopt.

Well-being variables are regarded as categorical and ordinal in nature (Ferrer-i-Carbonell & Frijters, 2004). Variables with ordinal levels of measurement are, as well as being mutually exclusive categories, ordered categories from low to high. However, the intervals between the various categories are not precise or equal (Leech *et al.*, 2008). The literature employs ordered probit models for several reasons. Firstly, the ordered probit model does not assume that a rise in subjective well-being from "not at all happy" to "not very happy" is identical to a rise from "quite happy" to "very happy" (McBride, 2001). Secondly, an ordered logit model assumes that the εi is logistically distributed whereas the ordered probit model assumes that the εi is normally distributed (Borooah, 2002). Greene (2000) argues that the justification of one distribution over the other is problematic on theoretical grounds. Researchers however, commonly assume a normal distribution when the true distribution is unknown (Greene, 2000). Lastly, subjective well-being measurements have an inherent ordering which is not accounted for when using a standard multinomial probit model (McBride, 2001). Ordered probit models account for this inherent ordering.

2.3: Well-Being and National Income - Literature Review Introduction

Governments endlessly emphasise the importance of economic growth (Diener *et al.,* 2013). Indeed, economic growth, because of the conviction that rises in national income cause increases in national well-being levels, has been a fundamental aim in the majority of modern states (McBride, 2001). This results in the well-being-income relationship being of primary importance. Easterlin (1974) finds that average national well-being is unrelated to GDP per head. However, Easterlin (1974) identifies a statistically significant positive correlation between individual measures of subjective well-being and individual income in the microeconomic literature.

A number of economists argue that the modified Easterlin hypothesis is a possible explanation of the inconsistent results provided by Easterlin (1974). This hypothesis states that a positive well-being-income relationship prevails only in low GDP per capita nations where basic needs are not met (Clark *et al.,* 2008). When a specific national income threshold is obtained, extra income results in little if any supplementary aggregate well-being (Clark *et al.,* 2008). Therefore, increasing income does not result in increases in well-being ad infinitum as rises in well-being tail off as absolute income grows (Frey & Stutzer, 2002b).

Stevenson and Wolfers (2013: 598) state that this income threshold level may be referred to as a "*satiation point*". Stevenson and Wolfers (2013: 598) also claim that the hypothesis that a positive well-being-income relationship prevails only for low income nations and individuals may be referred to as the "*modified Easterlin hypothesis*". This is despite Easterlin himself never claiming such an income threshold level. Although economic literature vastly agrees that aggregate well-being increases with GDP for low-income nations the well-being-income relationship for high-income nations is still disputed (Deaton, 2008). This section reviews the literature that concerns itself with the relationship between well-being and national income. Subsection 2.3.1 comprises itself with literature regarding cross-country comparisons of well-being and income. While Subsection 2.3.2 concentrates on literature which concerns itself with the existence of a satiation point.

2.3.1: Cross-Country Comparisons of Well-Being and Income

Existing literature regarding the cross-country well-being-income relationship is founded on fragile and incomplete evidence (Stevenson & Wolfers, 2008). Easterlin (1974: 104) asks "*are richer countries happier countries*?" and identifies that well-being levels do not have a strong correlation with average levels of national income. An on-going debate, concerning the accuracy of this finding exists (Diener *et al.,* 2013). Indeed Easterlin's (1974) finding has been widely disconfirmed (Di Tella *et al.*, 1999; Blanchflower & Oswald, 2004a; Inglehart, 1990). With Easterlin (1995: 42) even stating that "*a positive happiness-income relationship typically turns up in international comparisons*".

The first studies to conduct cross-country analysis of subjective well-being and national income include Strunk (1949), Cantril (1951) and Buchanan and Cantril (1953). Strunk (1949) reports a positive well-being-GDP relationship. Strunk (1949) uses Gallup 1949 data from Australia, Canada, France, the Netherlands, Norway, Great Britain and the United States. The Gallup 1949 well-being question used by Strunk (1949) reads as follows: "*In general, how happy would you say you are - very happy, fairly happy, or not very happy*?" Cantril (1951) reports a positive well-being-GDP relationship. Cantril (1951) uses Gallup 1946 data from Canada, France, Great Britain and the United States. Gallup's 1946 well-being question used by Cantril (1951) reads as follows: "*In general, how happy would you say you are - very happy, fairly happy, or not very happy*". Buchanan and Cantril (1953) state a positive well-being-GDP relationship. Buchanan and Cantril (1953) report on a UNESCO study entitled "Tensions Affecting International Understanding". Nine nations are included in this study namely Australia, France, Germany, Italy, the Netherlands, Norway, Mexico, Great Britain and the United States. The well-being question answered by respondents in this study reads as follows: "*How satisfied are you with the way you are getting on now? - very, all right, or dissatisfied*".

These initial cross-country studies on well-being and income are however, based on a small number of nations with comparable income per capita. Therefore, they do not offer definitive findings on the well-being-GDP relationship (Stevenson & Wolfers, 2008). Easterlin (1974) also states that in these initial studies, any positive well-being-

GDP association identified between well-being and national income is not clear. Additionally, these early studies analyse the well-being-income relationship in terms of absolute levels of GDP per capita and not by the log of GDP per capita. This results in a lack of clarity around the well-being-income relationship among rich nations (Stevenson & Wolfers, 2008).

Subsequent cross-country analysis of subjective well-being and national income include Cantril (1965) and the renowned Easterlin (1974) study. Cantril (1965:194) reports a positive well-being and GNP per capita relationship. Cantril (1965) uses Patterns of Human Concerns 1960 data from Brazil, Cuba, the Dominican Republic, Egypt, Germany, India, Japan, Nigeria, Panama, Poland, United States, Philippines, Israel and Yugoslavia. Surveys were carried out between 1957 and 1963 employing Cantril's "Self-Anchoring Striving Scale". This scale inquires about the best and worst possible future that individuals can envision themselves as having. Then a picture of a ten-step ladder is displayed and respondents are asked, "*Here is a picture of a ladder. Suppose that we say the top of the ladder [pointing] represents the best possible life for you and the bottom [pointing] represents the worst possible life for you. Where on the ladder [moving finger rapidly up and down ladder] do you feel you personally stand at the present time*".

The finding of a positive well-being-national-income relationship in the international data is however, not as clear cut as reported by Cantril (1965) (Easterlin, 1974). The suggestion of a positive relationship stems heavily on the data for India and the United States. According to Cantril (1965: 130-131), the data for Cuba and the Dominican Republic echo uncommon political circumstances. The data was collected in a time of prolonged political turmoil in the Dominican Republic and directly after a successful revolution in Cuba. Easterlin (1974: 106) states that there is not much evidence of a systematic association between well-being and national income in Cantril's (1965) study.

Easterlin (1974) identifies only a slight positive well-being-national-income relationship. Easterlin (1974) uses 1965 World Survey III data and reports cross-tabulations of data from France, Germany, Italy, Malaysia, the Philippines, Thailand and the United Kingdom. Additionally Easterlin (1974) provides cross-tabulations of

data from the United States October 1966 AIPO poll and Japanese data from the 1958 survey of Japanese national character. The well-being question answered by respondents in the 1965 World Survey III data reads as follows: "*In general, how happy would you say you are - very happy, fairly happy, or not very happy*". For Japanese data respondents had the option of choosing between "very happy", "fairly happy" or "not happy".

Easterlin (1974) argues that the results are ambiguous. The four poorest nations neither report the highest nor lowest happiness levels but rather approximately the medium. Easterlin (1974:108) states that "*If there is a positive association between income and happiness, it is certainly not a strong one*". Stevenson and Wolfers (2008) however, disagree with Easterlin's (1974) interpretation of the above findings. Using the same data as Easterlin (1974), Stevenson and Wolfers (2008) plot an ordered probit index. This quantifies the differences in average levels of well-being across nations relative to the within-country variations. In contrast to Easterlin's (1974) graphs, illustrating the mean well-being responses, Stevenson and Wolfers (2008) report ordered probit regression results. These results report rather large differences in well-being relative to the cross-sectional standard deviation (Stevenson & Wolfers, 2008). Likewise, the use of log income in Stevenson and Wolfers (2008) instead of absolute income emphasises the linear-log relationship.

The well-being-national-income correlations, found in these early studies, are not especially convincing. This does not imply that national income only has a minor effect on well-being, but that other factors also affect aggregate national well-being levels (Stevenson & Wolfers, 2008). Subsequent economic research, concerning the well-being-national-income relationship, is more compelling due to the use of log income and a vast quantity of nations with various levels of development. A comprehensive list of such research is displayed in Table A2.3.1 in the appendix. As displayed these studies overwhelmingly find a positive well-being-GDP gradient. This indicates that people compare themselves to a society outside their own country and that individuals evaluate themselves by their place in the international sphere (Graham & Felton, 2006).

2.3.2: Satiation Point - Theory of Diminishing Marginal Utility

Numerous studies claim that upon obtaining a particular income level (satiation point) raising income levels further no longer results in greater well-being (Frey & Stutze, 2010). A clear consensus when regarding the existence or magnitude of this modified Easterlin hypothesis has not been reached (see subsections 2.3.2.1 and 2.3.2.2). This hypothesis claims that once a certain national income threshold is reached additional income results in little, if any, additional aggregate well-being (Stevenson & Wolfers, 2013). Thus, raising national income does not increase well-being ad infinitum as increases in well-being tail off as absolute income rises (Frey & Stutzer, 2002b).

Here the underlying theory is that of diminishing marginal utility (Frey & Stutze, 2010). This theory states that increases in income result in increases in well-being but by decreasing rates. Put alternatively, this theory proclaims that the effect, on individual well-being, of a 2,000 euro rise in real income becomes progressively smaller the larger the initial level of income. This theory assumes a curvilinear relationship when considering the functional form of the subjective-well-being-income relationship (Veenhoven, 1989). Therefore, goods and services which are consumed first give greater utility/well-being[2.3.2] than goods and services which are consumed subsequently (Pukeliene & Kisieliauskas, 2013).

According to this theory increases in national income amongst low GDP economies raises aggregate well-being to a greater extent than for economies with higher GDP per capita (Pukeliene & Kisieliauskas, 2013). Thus, developed economies are at a point of personal consumption where marginal utility obtained from additional consumption is minimal (Frey & Stutze, 2010). Poorer economies however, receive great gain from increases in personal consumption (Inglehart, 1997). Table 2.3.2 presents various explanations of diminishing marginal utility identified in the well-being-income literature.

[2.3.2] Well-being surveys are reported to measure utility and therefore this thesis occasionaly uses the terms utility and well-being interchangably. As stated by Frey and Stutzer (2010: 43) "*Utility can and should be cardinally measured in the form of subjective well-being*".

Table 2.3.2: Explanations of Diminishing Marginal Utility in Various Economic Literature

Source	Explanations of Diminishing Marginal Utility
Veenhoven, (1989:15-18)	*"[W]e not only see a clear positive relationship [between happiness and GNP per capita], but also a curvilinear pattern; which suggest that wealth is subject to a law of diminishing happiness returns"*
Frey and Stutze, (2010: 90)	*"Comparing across countries, it is true that income and happiness are positively related and that the marginal utility falls with higher income. Higher income clearly raises happiness in developing countries, while the effect is only small, if it exists at all, in rich countries"*
Inglehart, (1997: 61)	*"The early phases of economic development [as measured by GNP per capita] seem to produce a big return . . . in terms of human happiness. But the return levels off . . . Economic development eventually reaches a point of diminishing returns . . . in terms of human happiness"*

(Source: Author's own)

2.3.2.1: Finding of a Satiation Point in the Well-Being-Income Relationship

A clear consensus when regarding the existence or magnitude of the modified Easterlin hypothesis has not been reached. Statements regarding the existence of a satiation point are made by a number of economists. Clark *et al.,* (2008: 96) claim that once wealthy nations have fulfilled basic needs, they are on the "*flat of the curve*" with extra income resulting in little if any additional well-being. Whereas Di Tella and MacCulloch (2008) state that once basic needs are satisfied, full adaptation to additional economic growth occurs.

Layard (2003) claims that if a nation's GDP per capita is over $15,000 national well-being levels appear to be independent of income. In a subsequent study however, Layard (2005a) argues for a $20,000 threshold. Frey and Stutzer (2002a) state that income increases well-being at low levels of development but when a threshold of approximately $10,000 GDP per capita is achieved national average income has little effect on average national subjective well-being. Clark *et al.,* (2008) claim that more economic prosperity ceases to increase well-being at some point. Whereas, Di Tella and MacCulloch (2008) state that once basic needs are satisfied full adaptation to additional economic growth occurs. Diener and Seligman (2004) state that, beyond a particular income threshold, there is diminutive enhancements to well-being. Despite vast claims of the existence of such a satiation point no study finds official statistical evidence to support it (Stevenson & Wolfers, 2013).

When determining the existence of a satiation point, the previously stated empirical works, conduct visual analysis of a scatter plot depicting GDP per capita on the horizontal axis and well-being on the vertical axis (Stevenson & Wolfers, 2013). The depiction of a curvilinear relationship between well-being and income led to the conclusion of diminishing marginal utility and evidence of a satiation point (Layard, 2003). However, this well-being-income relationship does not necessarily reach a threshold level beyond which further increases in well-being are absent. Indeed a visual scatter plot examination of the well-being-income relationship is of limited use (Frey & Stutzer, 2002a). This results as the visually depicted correlation between well-being and income may stem from factors other than income alone (Frey & Stutzer, 2002a). Nations with higher per capita income often have more stable democracies

and possess higher stability in basic human rights than poor nations (Frey & Stutzer, 2002a). In addition to democracy, nations with higher income generally possess higher levels of average health. Thus, democracy, health and basic human rights may seemingly portray a positive relationship between well-being and national income. Furthermore, the above literature considers the well-being- absolute-income relationship instead of the well-being-log-income relationship. As discussed in Subsection 2.3.3.4 this may lead to inaccurate findings.

2.3.2.2: Finding of No Satiation Point in the Well-Being-Income Relationship

Other economic studies report no evidence of a satiation point after which the positive well-being-income relationship flattens out. Stevenson and Wolfers (2008) do not find any evidence of a satiation point after which greater GDP per capita fails to be associated with increases in well-being. Stevenson and Wolfers (2008) estimate the well-being-log-income gradient, for income over and under an income threshold of $15,000 GDP per capita, by employing an ordered probit regression. This allows the assessment of whether the well-being-GDP gradient fluctuates for rich and poor nations.

Stevenson and Wolfers (2008) identify a distinct positive relationship between average levels of individual well-being and log GDP per capita even when comparison are made among developed economies. Thus, Stevenson and Wolfers (2008) do not report any evidence of a satiation point after which greater GDP per capita fails to be associated with more well-being. Indeed, Stevenson and Wolfers (2008) identify a slight stronger (instead of weaker) relationship between subjective well-being and log GDP per capita in richer nations. Only in a few cases however, is this finding statistically significant.

In a subsequent study Stevenson and Wolfers (2013) confirm their initial 2008 finding of no satiation point both for cross-national comparisons between rich and poor nations and for within nation comparisons between rich and poor individuals. Indeed, Stevenson and Wolfers (2013) identify no evidence of any satiation point when using a variety of datasets (World Values Survey, Gallup World Poll, Pew Global Attitudes Studies and the International Social Survey Program), various subjective well-being measurements (life satisfaction and happiness) and various income threshold levels (income threshold levels of $8,000, $15,000 and $25,000 as well as the median level of income for the sample).

Similarly, Deaton (2008) identifies no evidence of a satiation point when analysing both a visual scatter plot and a formal regression of the well-being-income relationship. Deaton (2008) reports that life satisfaction is greater in nations with higher GDP per capita when visually analysing a scatter plot. This scatter plot depicts

GDP per capita in 2003 on the horizontal axis and average life satisfaction on the vertical axis. The slope is steepest among the poorest nations, where an increase in income is associated with the greatest rise in life satisfaction. A satiation point is however, never reached - the slope remains positive and substantial for rich nations. Additionally, Deaton (2008) plots average life satisfaction against the logarithm of GDP per capita. Here a close to linear life satisfaction and GDP per capita relationship is revealed.

Deaton (2008) also conducts a formal regression analysis for the 123 nations of which both life satisfaction (2006 Gallup World Poll data) and GDP per capita (in PPP, Penn World Table data) data is available. When using the log of income and the whole sample (rich and poor nations) Deaton (2008) reports a close to linear life-satisfaction-income relationship with a coefficient of 0.838 and a small standard error. When splitting the sample into rich nations (GDP per capita in excess of $12,000) and poor/middle income nations (GDP per capita of less than $12,000) Deaton (2008) finds no evidence of a satiation point. Deaton (2008) shows that with GDP per capita measured in log terms, the slope in rich nations (1.625) is higher than the slop for poor and middle-income nations (0.690). Deaton (2008) states that results indicate that the positive relationship between life satisfaction and log of income is consistent for all nations, whether rich or poor. Deaton (2008) also states that if there is any deviating evidence it is minor and in the direction of the slope being larger among rich nations. When testing an alternative income threshold level Deaton (2008) confines the sample to 25 nations with GDP per capita in excess of $20,000 and identifies that the slope falls to 0.384. Thus, Deaton (2008) identifies that every additional dollar of income results in a larger increment in well-being for the poor than for the rich. A particular satiation point is however, not identified.

Sacks *et al.,* (2010) using cross national evidence and various data sets, report a statistically significant relationship between average national levels of life satisfaction and the log of GDP per capita. The data observes the same linear-log life-satisfaction-income gradient for poor and middle-income nations as for rich nations. Thus, no evidence of any satiation point is found. Sacks *et al.,* (2010) exhibits graphs plotting average (standardized) life satisfaction data, drawn from various data sets, against the

log of GDP per capita. The graphs demonstrate both the OLS regression line and a non-parametric (lowess) fit.

Using Pew Global Attitudes Survey data, from 44 developed and developing nations, Sacks *et al*., (2010) present graphical evidence of no satiation point across nations. A graph is in the form of a scatter plot depicting log of GDP on the horizontal axis and life satisfaction on the vertical axis. The graph depicts wealthier nations exhibiting higher levels of life satisfaction than poorer nations. The nonparametric fit shows life satisfaction increasing with log GDP at similar rates for both rich and poor nations. Therefore, no evidence is seen that the life-satisfaction-log-income gradient diminishes as income increases. This suggests that no included nation is rich enough to reach a satiation point if indeed such a satiation point occurs (Sacks *et al*., 2010).

Sacks *et al.,* (2010) using the larger Gallup World Poll dataset, also plot the life satisfaction ladder scores against per capita GDP for 131 developed and developing nations. The graph confirms that wealthier nations have greater levels of life satisfaction than poorer nations. This relationship is also depicted as approximately linear-log. The correlation between average national life satisfaction and log GDP per capita is over 0.8. The non-parametric fits reveal the linear-log relationship which depicts no evidence of satiation. The well-being-GDP relationship fails to diminish at high levels of income. Indeed the lowess curve seems to curve upwards more sharply at high levels of GDP per capita (Sacks *et al.,* 2010).

Sacks *et al*., (2010) also present graphical evidence of no satiation point within 25 of the largest nations globally, using data from the Gallup World Poll. The graph is in the form of a scatter plot depicting log of household income on the horizontal axis and life satisfaction on the vertical axis. This graph demonstrates that wealthier individuals, of a given nation, report higher life satisfaction levels. For most nations, the graph reveals that life satisfaction increases linearly with the log of income. Furthermore, the gradient is similar across nations, with the estimated line for each nation visually appearing like parallel shifts of one another. Despite the vast differences among these nations, the relationship between life satisfaction and income is remarkably comparable. This graph illustrates no evidence of any satiation point as the curve is just as steep for high income individuals as low income individuals.

Therefore, Sacks *et al.,* (2010) using a variety of data sets, scatter plots and non-parametric fitted values find no evidence of a satiation point both across and within nations.

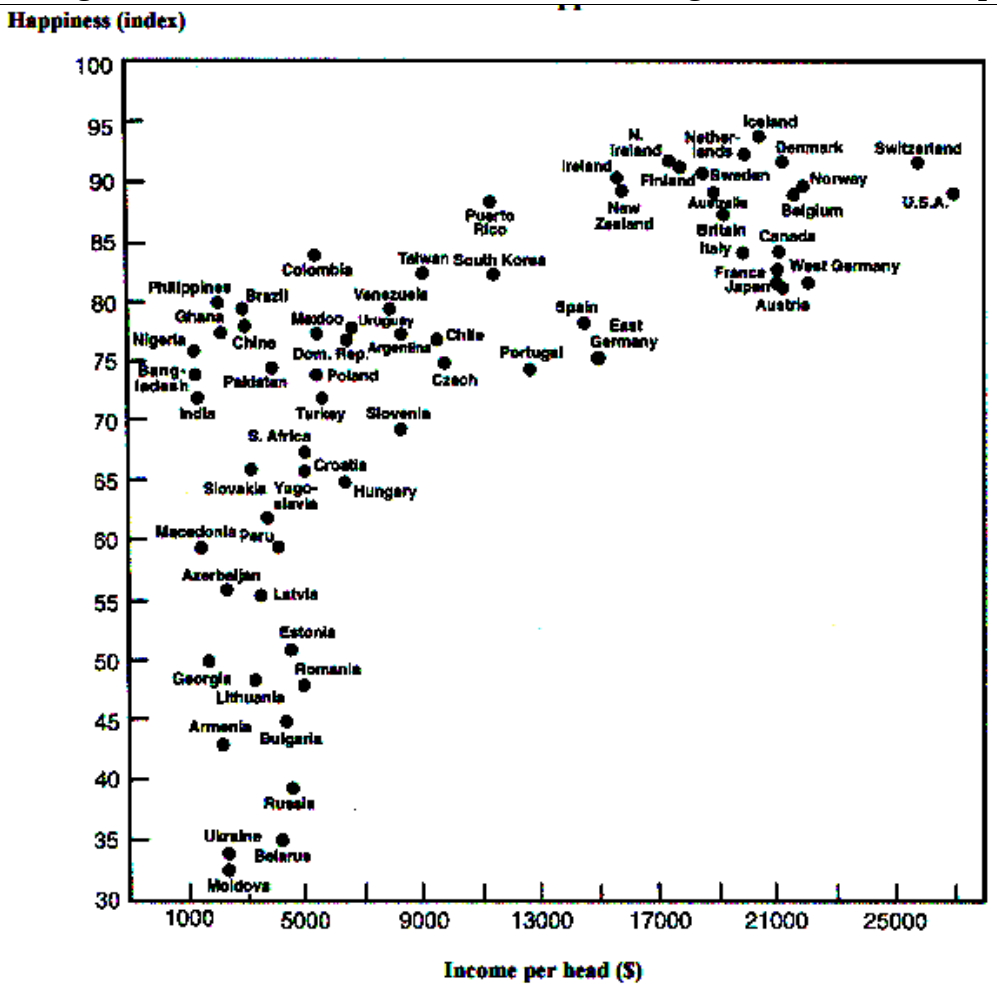
2.3.3: Methodological Issues and Empirical Approach

Numerous methodological issues arise when testing the modified Easterlin hypothesis. Issues include questions concerning which regression technique to apply, which regression form to adopt, which income threshold level to use, whether the logarithmic specification of income should be assumed and what income data conversion should be used. The issue concerning regression technique may be found in Sections 2.2.5.1. The issues concerning regression form, income threshold level, income data conversion and logarithmic specification of income is discussed in the following subsections.

2.3.3.1: Income Threshold Level

Diener (2000) suggests that beyond a GNP per capita of around $8000, the association between wealth and satisfaction disappears. Layard (2003) claims that for nations with GDP per capita over $15,000 well-being and income are independent of one another. However, for nations with GDP per capita under $15,000 well-being and income are positively related (Layard, 2003). Layard (2003) finds that once a nation has an excess of $15,000 per head, aggregate well-being appears to be independent of income per head. For poorer nations however, there is a distinct positive relationship between well-being and income. As stated by Layard (2003: 17) "*When you are near the bread-line, income really does matter*". This statement is made from the visual analysis of a scatter plot (sourced from Inglehart and Klingemann (2000) and illustrated in Figure 2.3.3.1) depicting income on the horizontal axis and happiness on the vertical axis.

Figure 2.3.3.1: Satiation Point in the Well-Being-Income Relationship

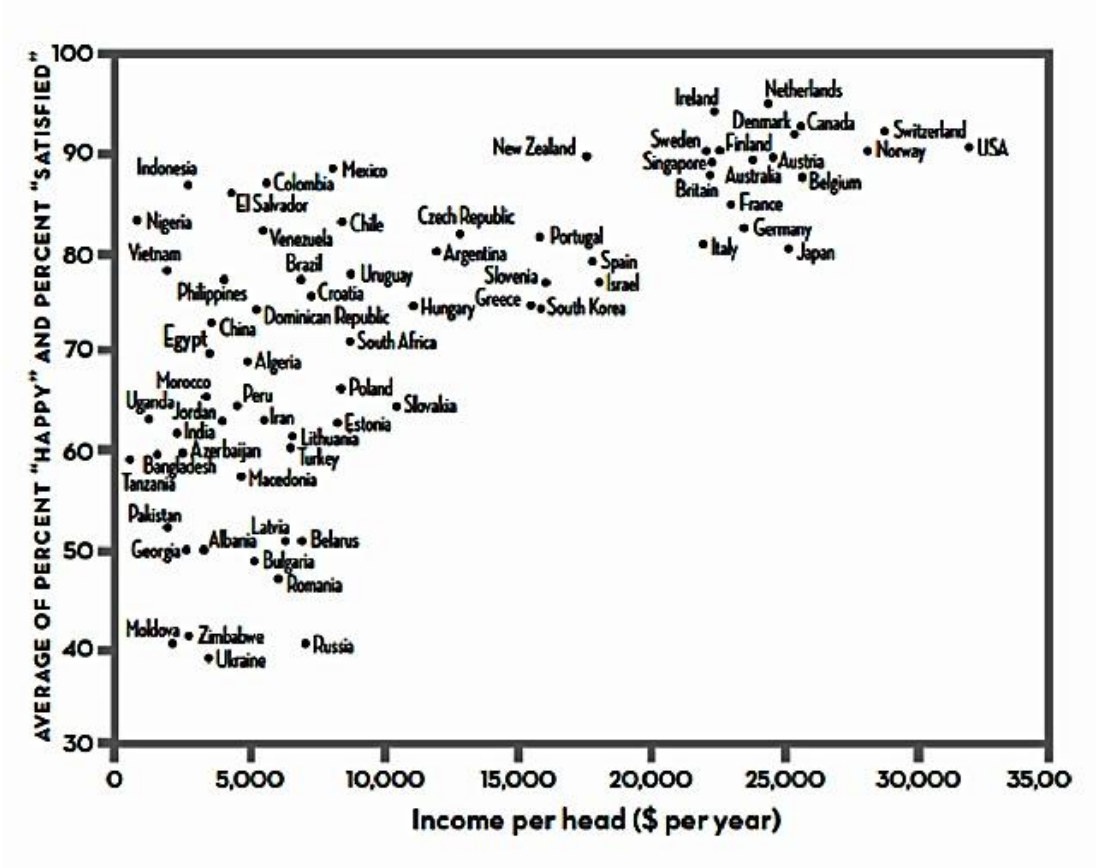


Source: Inglehart and Klingemann (2000), Figure 7.2 and Table 7.1. Latest year (all in 1990s).

(Source: Layard, 2003:18)

In a subsequent study Layard (2005b: 149) confirms his earlier 2003 finding. Layard (2005b) identifies no evidence that richer nations possess higher aggregate well-being than poorer nations. This is however, only revealed when the data is confined to nations with incomes over $15,000 per head. Nations with income levels of less than $15,000 per head show different results. Alternatively, Layard (2005a) reports that any additional income above $20,000 is not associated with extra well-being. This claim is derived from the visual analysis of a scatter plot (displayed in Figure 2.3.3.1a) depicting income on the horizontal axis and happiness on the vertical axis.

Figure 2.3.3.1a: Satiation Point in the Well-Being-Income Relationship



(Source: Layard, 2005a)

Frey and Stutzer (2002a) state that income increases well-being at low levels of development but when a threshold of approximately $10,000 GDP per capita is achieved, average national income has little effect on average national subjective well-being. This finding is drawn from a scatter plot illustrating the relationship between GDP per capita and average life satisfaction in fifty-one nations using data from the two 1990 World Values Survey waves. From this scatter plot (displayed in Figure 2.3.3.1b) Frey and Stutzer (2002a) identify the presence of an increasing concave well-being-income relationship.

Figure 2.3.3.1b: Satiation Point in the Well-Being-Income Relationship

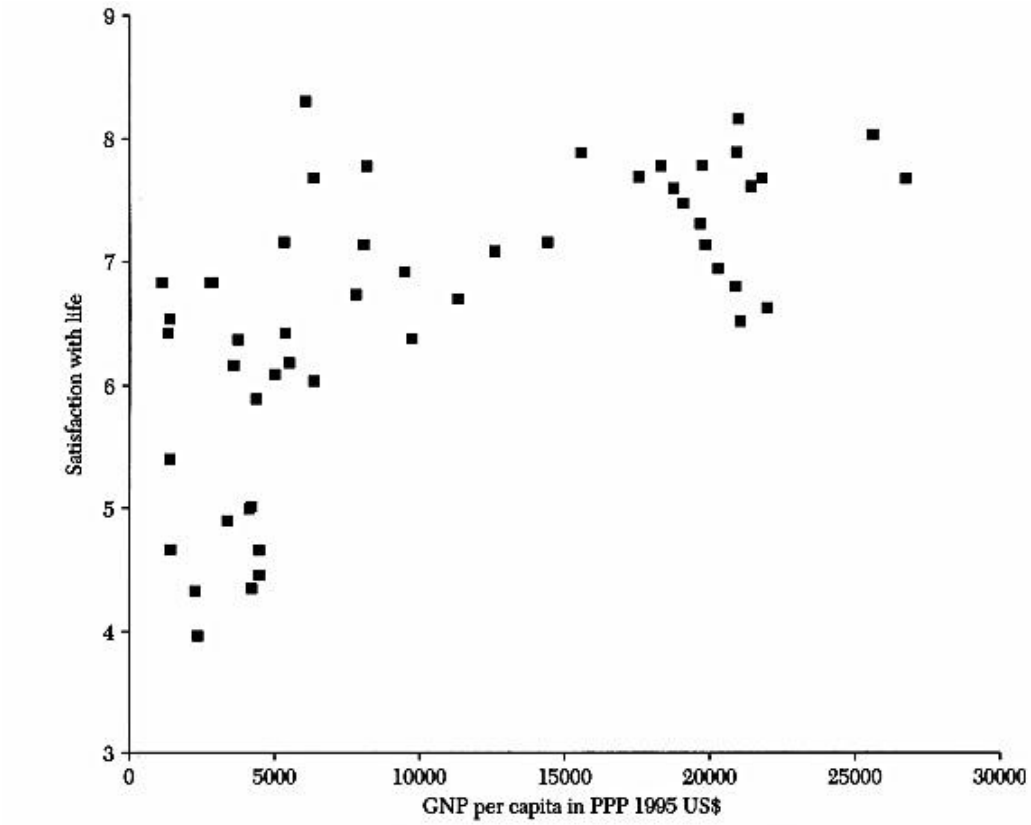


Figure 4. Life Satisfaction and Income Levels Across the World in the 1990s

Sources: World Values Survey 1990–93/1995–97 (ICPSR 2790) and World Development Report 1997.

(Source: Frey & Stutzer, 2002a:33)

2.3.3.2: Regression Form

Cross-National Comparisons of Well-being and Income

Testing the modified Easterlin hypothesis involves an analysis of the existence of a particular income level beyond which a change in the well-being-GDP relationship occurs. This is achieved through the estimation of separate "rich nation" and "poor nation" regressions (Stevenson & Wolfers, 2013). The measure of economic development is the log of GDP per capita based on PPP (Stevenson & Wolfers, 2013). "Rich" nations are defined as those with per capita income in excess of $15,000 and "poor" nations as those with per capita income of less than $15,000 (Layard, 2003).

The empirical assessment of the Easterlin hypothesis comes from regressions of the form (Stevenson & Wolfers, 2013):

$$WB_n = \alpha + \beta poor I(GDP_n < k) \times (log(GDP_n) - log(k)) + \beta rich I(GDP_n \geq k) \times (log(GDP_n) - log(k)) + \varepsilon_n \quad \textbf{(2.3.3.2a)}$$

Where:

WB	=	dependent variable namely well-being
n	=	nation
a	=	constant
βpoor	=	well-being-income gradient for "poor" nations (GDP<$k)
βrich	=	well-being-income gradient for "rich" nations (GDP≥$k)
GDP	=	GDP per capita
k	=	cut of level of GDP per capita
ε	=	error term

The coefficients on the explanatory variables are the interaction of log per capita GDP with a dummy variable depicting if per capita GDP is over or under a cut of level, $k ($15,000)(Stevenson & Wolfers, 2013). The functional form, when calculating log(GDP) relative to a threshold income, permits for a shift in the well-being-income gradient once per capita GDP surpasses the particular threshold. This specification enables two variations of the modified Easterlin hypothesis to be tested. First whether, beyond a particular threshold of basic needs, income is uncorrelated with well-being (βrich = 0) and second, whether the well-being-income relationship determined for poor nations differ from that determined for rich nations (βpoor > βrich) (Stevenson & Wolfers, 2013).

In addition to the statistical evidence, a scatter plot and a non-parametric fit of the income-well-being data enables a visual assessment of whether the income-well-being relationship changes at any particular income level threshold. This scatter plot displays average levels of well-being and GDP per capita plotted on a log scale. The solid line of this scatter plot reveals the results from an OLS regression, estimated for all observations (Stevenson & Wolfers, 2013):

$$WB_n = \alpha + \beta \log (GDP_n) + \varepsilon_n \qquad \textbf{(2.3.3.2b)}$$

Where:

WB	=	dependent variable namely well-being
n	=	nation
a	=	constant
log GDP	=	explanatory variable
ε	=	error term

This scatter plot visually depicts the well-being-GDP relationship. A local linear regression in the form of a dotted line is also illustrated. This permits a non-parametric fit of the well-being-income relationship. If a particular national income level, beyond which a change in the well-being-income relationship exists, than this non-parametric fit would flatten out once this particular national income level is reached (Stevenson & Wolfers, 2013).

2.3.3.3: PPP Income Data

The use of PPP's is considered an essential inclusion as it removes differences arising from arbitrary exchange rates (O'Connell, 2004). The PPP theory states that the nominal exchange rate among two currencies ought to be equal to the ratio of aggregate price levels between the two nations (Taylor & Taylor, 2004). This principle is based on the proposition that one unit of currency in a particular nation has an identical purchasing power in a foreign nation (Taylor & Taylor, 2004) and thus an identical basket of goods should be the same price in both nations when prices are cited in the same currency.

The theory of PPP has long been used by economists for several centuries (Taylor & Taylor, 2004). However, the precise terminology of PPP was implemented after World War I and stems from the international policy debate regarding the suitable level for nominal exchange rates between the chief industrialized nations after the high levels of inflation occurring during and after the war (Cassel, 1918). Subsequently the concept of PPP has become a primary way of thought for many international economists. Dornbusch *et al.,* (1976:540) for instance state "*Under the skin of any international economist lies a deep-seated belief in some variant of the PPP theory of the exchange rate*." Rogoff (1996:647) similarly states "*While few empirically literate economists take PPP seriously as a short term proposition, most instinctively believe in some variant of purchasing power parity as an anchor for long-run real exchange rates*."

2.3.3.4: The Logarithm of Income

When determining the functional form of the subjective-well-being-income relationship many previous analyses found a curvilinear relationship due to the absolute income and well-being relationship being considered (Stevenson & Wolfers, 2008). This often led to the theory of a satiation point as evidence of a precise linear relationship between well-being and income was not identified (Stevenson & Wolfers, 2008). However, representing well-being as a function of the logarithm of income has been cited in economic literature as superior. When referring to within nation findings Easterlin (2001: 468) states that the thought attenuation, at higher income levels, of the well-being-income relationship does not take place when well-being is regressed on log income instead of on absolute income.

The individual well-being function is thought to be concave in income and, subsequently, income is presented in logarithmic form (Ferrer-i-Carbonell, 2005). Deaton (2008: 58) also necessitates the use of log-income and illustrates that the log specification yields a better fit when assessing the well-being-income relationship. If indeed well-being and log income are linearly related in the within-nation cross sectional analysis, then cross-national studies ought also to examine the correlation between average levels of subjective well-being and average levels of log income (Stevenson & Wolfers, 2008). If GDP per capita increases individual incomes equi-proportionately, then average log income will increase and decrease in tandem with the log of average income (Stevenson & Wolfers, 2008).

2.3.4: Section Conclusion

Governments endlessly emphasise the importance of economic growth (Diener *et al.,* 2013). Indeed, economic growth, because of the conviction that rises in national income cause increases in national well-being levels, has been a fundamental aim in the majority of modern states (McBride, 2001). This results in the well-being-income relationship being of primary importance. Easterlin (1974) finds that average national well-being is unrelated to GDP per head. However, Easterlin (1974) identifies a statistically significant positive correlation between individual measures of subjective well-being and individual income in the microeconomic literature.

An explanation for the seemingly conflicting findings is the modified Easterlin hypothesis. This hypothesis states that upon obtaining a particular income level, enabling the consumption of basic needs, raising income further no longer results in greater well-being (Stevenson & Wolfers, 2013). Thus, raising income does not increase well-being ad infinitum as increases in well-being tail off as absolute income rises (Frey & Stutzer, 2002b). This hypothesis assumes that once an individual's basic material needs are satisfied, non-material wealth such as health and religion primarily determines an individual's well-being. This hypothesis coincides with the theory of diminishing marginal utility of consumption and income which is characterised by the neoclassical theory of utility.

A clear consensus of the existence or magnitude of the modified Easterlin hypothesis has not been reached. Statements regarding the existence of a satiation point were made by a number of economists. Layard (2003), Frey and Stutzer (2002a) and Layard (2005a) all claim such an existence when conducting visual analysis of a scatter plot depicting GDP per capita on the horizontal axis and well-being on the vertical axis. However, these visual scatter plot examinations, of the well-being-income relationship, are of limited use (Frey & Stutzer, 2002a). Despite vast claims of the existence of such a satiation point no study finds official statistical evidence to support it (Stevenson & Wolfers, 2013). Indeed other economic studies report statistical evidence of no satiation point after which the positive well-being-income relationship flattens out (Stevenson & Wolfers, 2008). These studies include Stevenson and

Wolfers (2008), Stevenson and Wolfers (2013), Deaton (2008) and Sacks *et al.*, (2010).

2.4: Well-Being and Income Inequality - Literature Review Introduction

The following section concerns itself with the literature review of well-being and income inequality. This section outlines the complex approaches and theories within the inequality literature. This section also consists of a comprehensive literature review and discussion of the methodological issues and empirical approach concerning the well-being-income-inequality literature.

Beyond defining both inequality and income inequality the following subsection also discusses the effect of income inequality on well-being, theories of inequality and the various factors which affect income inequality.

2.4.1: Definition of Income Inequality

Inequality is "*social or economic disparity between people or groups or the condition or an instance of not being equal*" (Tóthová, 2011:4). Inequality is not a self-defining term (Cowell, 2000). Ngepah (2010) claims that inequality is a broad concept which may be defined in numerous contexts. In addition to money metric measures, including income, assets and expenditure, inequality may refer to a broader concept such as access to education, health, capital, social mobility or opportunities (Ngepah, 2010).

The most deliberated element of inequality is that of income (Mussagy, 2014). Income inequality measures "*disparity between a percentage of population and percentage of income received by that population*" (Tóthová, 2011:4). Income inequality is the income gap between segments of a society (Billingsley, 2014). Kaplan *et al.*, (1996) define the degree of income inequality as the percentage of total household income received by the less well off 50% of households in a nation.

2.4.1.1: The Effect of Income Inequality on Well-Being

Studies concerned with the relationship between subjective well-being and income inequality have been partially inspired by the vast literature on well-being and income (Verme, 2011). Easterlin (1974) founded the economics of well-being in the 1970s and finds that, while average reported well-being levels disclose significant variances within countries, they fail to have a strong correlation with average levels of national income. The Easterlin paradox refers to this contradiction: that average national well-being is unrelated to GDP per head while at the micro level, well-being and individual income are positively related. The search for an explanation of the Easterlin paradox has led to the formulation of several theories most of which focus on the role of the reference income (Verme, 2011). Individuals evaluate their income relative to the incomes of a reference group (Ferrer-i-Carbonell, 2005). When applying the importance of reference income to the context of income inequality, opposite predictions about the impact of inequality on subjective well-being may result (Verme, 2011).

Globalization and market capitalism have increased inequality within most nations (Freeman, 2011). Numerous economic empirical studies claim that an increase in income inequality results in a decline in average well-being levels. This may explain Easterlin's (1974) finding that average reported well-being does not have a strong correlation with average levels of national income. Thus, as nations become richer the negative effect of income inequality on well-being may overshadow the positive effect of GDP on well-being. However, income inequality may be seen as an indication of income mobility and available opportunities as well as being an indication of injustice (Graham & Felton, 2005). Thus, depending on individual interpretations, well-being may have a positive or negative association with income inequality.

Income inequality remains a contentious area and its effect on individual well-being remains disputed within economic literature (Graham & Felton, 2005). Initially a negative well-being-income-inequality relationship was found in economic literature (Morawetz *et al*., 1977). Nevertheless, recent research reports diverse empirical results when measuring the degree or indeed if income inequality affects subjective well-being (Alesina *et al.,* 2004; Graham & Felton, 2006; O'Connell, 2004).

The effect of income inequality on well-being may be explained by a number of various arguments (Ferrer-i-Carbonell & Ramos, 2014). Firstly it has been argued that the relationship results from individual's self-interest. Individuals like/dislike income inequality if they believe that they may gain/loose from its presence (Ferrer-i-Carbonell & Ramos, 2014). Secondly, it has been argued that being for/against income inequality results from an individual's genuine concern for fellow citizens. This concern is beyond the direct effect of income inequality on individual well-being (Ferrer-i-Carbonell & Ramos, 2014). Therefore, individuals possess particular social preferences for fairness which influence their opinion on income inequality. Finally, relative income concerns may also explain the relationship between well-being and income inequality (Ferrer-i-Carbonell & Ramos, 2014). This occurs when individual's well-being increases from having greater income then their reference group and vice versa. What follows is a comprehensive discussion of these three explanations of the relationship between well-being and income inequality.

Self-Interest

Individual's aversion towards income inequality partly results from self-interested motives. Individual characteristics and personal circumstances, including experiencing a recession or a radical political or economic conversion, may shape opinions on income inequality (Ferrer-i-Carbonell & Ramos, 2014). Individuals may either associate income inequality with more or less future personal financial circumstances and future opportunities (Ferrer-i-Carbonell & Ramos, 2014). Associating income inequality with poorer future personal opportunities results in low acceptance of income inequality. Alternatively, associating income inequality with improved future opportunities results in more acceptance towards income inequality (Ferrer-i-Carbonell & Ramos, 2014).

Indeed individuals who are more risk averse are also found to be more income inequality averse (Ferrer-i-Carbonell & Ramos, 2010). This results when individuals view the income distribution as an indication of future income. Risk averse individuals fear the probability of becoming poorer when an economic shock occurs and therefore, are avers to income inequality. Alternatively, individuals who can only lose little or indeed nothing from an economic shock should favour income inequality (Ferrer-i-

Carbonell & Ramos, 2014). This results as an economic shock should signal the possibility of an improved future. Likewise, individuals with future prospects of upward mobility ought to have higher tolerance for income inequality (Hirschman & Rothschild, 1973). Individuals who predict that they will move up the income ladder have enhanced prospects in societies with more unequal income distributions and therefore, will support income inequality. Viewing income inequality on an aggregate level, nations with rapid development may initially demonstrate acceptance towards large income inequalities because this implies greater opportunities. Nevertheless, as these optimistic expectations fail to be realised, tolerance for income inequality may reduce dramatically (Hirschman & Rothschild, 1973; Grosfeld & Senik, 2010).

Attitudes towards income inequality are also affected by an individual's past experiences (Ferrer-i-Carbonell & Ramos, 2014). Experiencing past misfortune may intensify an individual's risk aversion because past misfortune may result in more pessimistic views regarding future prospects of upward mobility (Piketty, 1995). Likewise, prospects of future income mobility also determine attitudes towards income inequality. Individuals who predict that their income will fall will show preference for a more equal income distribution and vice versa (Bénabou & Ok, 2001).

An aversion to income inequality may also result from a belief that particular well-being reducing features of society, such as criminal activity, results from income inequality (Ferrer-i-Carbonell & Ramos, 2014). Individuals who are prone to becoming victims of crime should, *ceteris paribus*, have a stronger detest for income inequality (Ferrer-i-Carbonell & Ramos, 2014). This aversion for income inequality does not result from a dislike of income inequality itself, but from the indirect effect of income inequality on crime.

Regard for Others

Individual's aversion towards income inequality may partly result from regard for others. An increasing quantity of literature claims that individuals are influenced by strictly egalitarian preferences (Fehr & Schmidt, 1999). Concerns and beliefs regarding fairness also significantly affect attitudes towards income inequality. Individuals are not only concerned with outcomes, but also how these outcomes came

about (Ferrer-i-Carbonell & Ramos, 2014). Thus, individuals are concerned with the fairness of the process that results in certain outcomes.

Disregarding the well-being individuals directly obtain from a process being fair (entitled procedural utility by Frey *et al.,* (2004)), individuals tend to have a higher opinion of an outcome when this outcome is perceived to have a fair process. This states that preferences for income inequality also result from an individual's perception concerning the equality of the income generating process (Ferrer-i-Carbonell & Ramos, 2014). Individuals depict greater tolerance for income inequality when personal income is believed to result from individual effort instead of other factors which individuals believe should be unrelated to income, such as birth, discrimination, luck or corruption (Alesina *et al.,* 2004). Indeed in nations where personal effort is thought to be the chief determinant of personal income, limited income redistribution and taxation will exist (Alesina & Angeletos, 2005).

Relative Concerns

The economic literature which determines the effect of relative concerns nearly unequivocally finds that an individual's position within the income distribution affects well-being (Dolan *et al.,* 2008). If an individual's well-being increases from having greater income then their reference group and vice versa, then estimating the effect of income inequality on well-being is not clear-cut.

Relative concerns appear to be asymmetric and therefore, relative concerns (significance of reference group income on individual well-being) might not be in contradiction with the aversion to income inequality. This means that individual's well-being is reduced from having less income than their reference group but not affected from having a higher income than their reference group (Ferrer-i-Carbonell, 2005). Fehr and Schmidt (1999) differentiate between upward comparisons, to those individuals who have more and downward comparisons, to those individuals who have less. In Fehr and Schmidt's (1999) model if individuals are envious of those who have more and compassionate with those who have less, then individuals will have greater well-being in more equal nations. This is true despite individual income being kept constant. Economic empirical evidence reports that relative concerns might in fact be asymmetric. If this empirical finding is confirmed, asymmetric relative concerns may

give an explanation for the negative effect of income inequality on well-being (Hopkins, 2008).

2.4.1.2: Theories of Well-Being and Income Inequality

Theories on the correlation between well-being and income inequality, throughout the twentieth century, have been divided between two rather extreme views (Verme *et al.*, 2014). The two influential income inequality theories are tunnel effect theory (Hirschman & Rothschild, 1973) and relative deprivation theory (Runciman, 1966).

The Tunnel Effect Theory

Hirschman and Rothschild (1973) argue that individuals may value inequality if it indicates social mobility. This phenomenon was labelled as the "tunnel" effect. Witnessing increases in incomes by others raises individual well-being as it improves expectations about social mobility in one's own future. As stated by Hirschman and Rothschild (1973: 546) "*The tunnel effect operates because advances of others supply information about a more benign external environment; receipt of this information produces gratification; and this gratification overcomes, or at least suspends, envy*".

This concept is explained by the analogy of the tunnel effect, used in Hirschman and Rothschild (1973), which goes as follows: A driver is stuck in a traffic jam inside a two-laned tunnel. All cars in both lanes are stationary. The driver is unable to see the end of the tunnel and is awaiting the jam to rectify itself when he suddenly notices that the cars in the other lane have started to move. Logically, the driver's anticipation increases as he now expects his lane also to clear soon. The driver initially believes that the inequality is a positive sign of better times to come and thus, will increase his well-being. However, after some time of observing cars in the other lane pass, while he is still waiting, he becomes disappointed and the inequality reduces his well-being (Hirschman & Rothschild, 1973:545).

Hirschman and Rothschild (1973) refer to the population as a whole and argue that improved social mobility, for part of a population, results in (at least short term) increased inequality, increased prospects and increased individual and social well-being. Thus, the tunnel effect theory implies a positive association between well-being and income inequality but does not determine which income group gains the most from income inequality. As stated by Hirschman and Rothschild (1973: 548) "*In this eventuality, the increase in income inequality would not only be politically tolerable;*

it would also be outright desirable from the point of view of social welfare". While Hirschman and Rothschild (1973) acknowledge that this positive effect on well-being does not persist in the long run and may also be reversed, the tunnel effect theory has offered theoretical support explaining why income inequality may be positively correlated with well-being.

Senik (2008) provides empirical confirmation of the tunnel effect occurring in highly mobile/uncertain nations including Russia, Hungary, Poland, the Baltic States and the USA. Senik (2008) finds that in these nations, self-reported individual life satisfaction is positively correlated with the incomes of individuals with the same professional characteristics. Clark *et al.,* (2009) employing linked employer-employee Danish panel data, find that tunnel effects outweigh status effects within companies. Clark *et al.,* (2009) report that job satisfaction increases with co-worker's salaries. Clark and Senik (2010) provide evidence of the tunnel effect occurring in Europe.

Research finding evidence of the tunnel effect predominantly reports that this effect is particularly evident in young individuals. This results as future wages of the young are more uncertain as they have more working years ahead of them. Young individuals in their early professions may be more likely to anticipate a promotion than may senior employees. Accordingly, research has emphasised the life cycle variation of the tunnel effects (FitzRoy *et al*., 2011; Akay & Martinsson, 2012).

The Relative Deprivation Theory

Runciman's (1966) relative deprivation theory provides a contradicting view to the tunnel effect theory when explaining the correlation between well-being and inequality. Runciman's (1966) relative deprivation theory states that individual feelings of deprivation may result from the relative position that an individual acquires in relation to a self-selected reference group. Runciman (1966) believes that inequality is instrumental in comprehending relative deprivation. Here the definition of relative deprivation is the feelings of deprivation when individuals compare themselves to a peer reference group. Feelings of deprivation do not result from absolute status but from a self-assessment of relative status that originates when comparing one's own income with the incomes of others. Thus, a rise in the distance between peer income

(a growth in inequality) results in more feelings of deprivation which leads to an aggregate increase in the aversion towards inequality.

Runciman's (1966) relative deprivation theory was operationalized later by Yitzhaki (1979). Formalising a measurement of relative deprivation Yitzhaki (1979) proposes the sum of the distance of an individual's income from all incomes situated in a higher income distribution. This measurement is equivalent to the absolute Gini index which is equal to the Gini multiplied by the mean. Essentially this view states that relative deprivation and inequality are extremely similar concepts (Verme *et al.*, 2014). A growth in inequality is anticipated to result in a rise in feelings of relative deprivation and aversion towards inequality.

The relative deprivation theory predicts that growth in income inequality will result in a rise in relative deprivation and a fall in individual well-being. Runciman's (1966) theory denotes that the poorest individuals (compared to their reference group) are most deprived and suffer the highest negative effect from income inequality. Poor individual's reference group always constitutes individuals with greater incomes, despite the reference group being restricted to sub-samples of the population. It is irrelevant whether the reference group constitutes the poor, the rich or both as individual well-being is solely defined within the individual's reference group. Thus, the poor ought to be more inequality averse than the rich.

2.4.1.3: Various National and Individual Factors Affecting Income Inequality

Economic Growth

Kuznets (1955) initiated the idea that inequality is a side-effect of economic growth. By doing so Kuznets (1955) inadvertently demoted the relevance of inequality from an economic indicator of significant alarm to an unavoidable result of economic growth. As stated by Stewart (2000: 5) the Kuznets curve is "*used as an excuse, for taking no action on income distribution*."

Concentrating on the level of income per capita (instead of income growth) across nations, Kuznets's (1955) broad conclusion is that inequality increases during the initial phase of development, then peaks and lastly starts to fall in the latter phrases of economic growth. This idea resulted in Kuznets's (1955) renowned inequality curve which is shaped as an inverted U. Kuznets (1955) proposes that this inverted U shaped curve principally results from the development of a rural agricultural economy to an urban industrial one.

Economic empirical literature, on the correlation between economic growth and income inequality, has reported mixed conclusions when evaluating Kuznet's (1955) theory (Anand & Kanbur, 1993; Deininger & Squire, 1998). Indeed a vast quantity of literature has emerged which critically evaluates both the premise of the Kuznets theory and its effect on public policy.

Critics of the Kuznets theory report numerous concerns. Some are sceptical of the alleged mechanism supporting the inverted U shaped curve (resulting from the sectorial shift from agriculture to industry) and propose other economic and non-economic indicators as its source. Robinson and Acemoglu (2002) proposition institutional and political alterations as the prime reason for the inverted U shaped curve. These changes stem from the increased power and influence of the common man over the elite. An alternative proposed mechanism is an asset distribution justification. The initial increase in inequality concerning the possession of assets is reduced as labour incomes grow relative to diminishing returns on capital (Aghion & Bolton, 1997).

Other critics of the Kuznets theory entirely dismiss the concept of an inverted U shaped curve. Ahluwalia (1976) reports no finding of a correlation between increases in income per capita and inequality. National studies find a reduction in inequality during times of growth in some nations and an increase in others, with no apparent relation to the country's phase of development (Bruno *et al.*, 1996; Robinson & Acemoglu, 2002).

Yet other critics completely dismiss the Kuznets theory, reporting that primarily, more equal distributions of income assist greater economic growth (Adelman & Morris, 1973). Alesina and Perotti (1994) show an inverse relationship between income inequality and investment and thus, economic growth. Alesina and Perotti (1994) conclude that the socio and political instability, resulting from income inequality, causes this negative relationship. Studying democratic nations Persson and Tabellini (1991: 617) conclude that "*income inequality is harmful for economic growth*" as it results in skewed policies, which fail to safeguard property rights and are unsuccessful when optimizing investment returns. Perotti (1996) states that more equality, in the middle class, reduces birth rates and aids economic growth.

Other Macroeconomic Factors

Excluding economic growth there are other macroeconomic factors which may affect the level of inequality (Kaasa, 2003). Inflation increases, in a particular nation, have been shown to lower the real incomes of the poor more dramatically than the rich. Bulíř (1998) studies a number of developing and developed economies and finds evidence that reduced inflation rates also lowers the level of income inequality. This however, is not a simple linear relationship and inflation is shown to have a reduced effect as it decreases (Bulíř, 1998). The relationship is most prevalent in low to middle income nations with extremely high levels of inflation. Gustafsson and Johansson (1999) however, find that the correlation between inflation and inequality can be mitigated when implementing an extremely progressive tax system.

Education

Demographic effects of income inequality have been vastly focused on within the literature. The most common papers, of this kind, focus on the correlation between inequality and education. A common consensus has been established that higher

education results in higher future income (Schultz, 1961; De Gregorio & Lee, 2002). Stewart *et al.,* (2009) suggest that inequalities in the availability to education contribute to future household income. This confirms the consensus of the "*positive economic returns to education*" (Nolan *et al.,* 2011: 427). Nevertheless, the relationship between education and income inequality is found to be more complex. Schütz *et al.,* (2008) using cross-national data, report that family background (initial economic security of households) influences the educational achievements of their children. This may increase pre-existing inequalities and lead to a persistence or indeed a rise in the prevailing income inequality (Machin & Vignoles, 2004).

Health

The negative correlation among poverty and health has been established within the economic literature. Here the causality is found to run both ways (Gupta & Mitra, 2004; Salway *et al.,* 2007; Anand & Ravallion, 1993). Individuals at the bottom of the income ladder often fail to have adequate access to health care and individuals who are extremely unhealthy tend to have inadequate income levels. The relationship between health and inequality is however, not as clear cut. Although the correlation, focused on here runes from health to income inequality, most literature assumes the reverse hypothesis. Kawachi *et al*., (1997) connect high income inequality to increased mortality rates and reduced levels of social capital.

The theoretical approach, clarifying the effect of health on income inequality, is concerned with individual availability to the labour market, education, social networks and marital status (Pourghadiri, 2012). Marital status is important as one's status will affect aggregate household income (Pourghadiri, 2012). This only is a concern if the author does not use equivalence scales and thereby fails to account for household size (Pourghadiri, 2012). When focusing on the causal links amongst health and income inequality Leigh *et al.,* (2009: 24) however, fail to find a "*statistically significant relationship either across countries or over time.*" Nevertheless, this finding does not confirm no correlation between the two variables, as the relationship may be exclusive to each particular nation, social or geographic location. Lynch *et al.,* (2000) also demonstrate that no simple association exists between health and income inequality and propose compound structural mechanisms determining how one affects the other.

Age, Ethnicity and Gender

Several alternative demographic factors including age, gender and ethnicity have been suggested as determinants of income inequality. The old and young are thought to obtain lower levels of income (Midwinter, 2006).

A vast quantity of literature exists on the results of ethnic diversity on income inequality (Lazear, 1995; Borjas, 1999; Malan, 2000; Robinson, 2002) although nonconforming opinions exist (Shi & Sai, 2013; Sullivan, 2011). This literature distinguishes the effect of ethnicity in the context of language diversity (Lazear, 1995), networking and role models within societies (Borjas, 1999) as well as race (Malan, 2000). These studies find that ethnically diverse nations report higher income inequality (Robinson, 2002). Alesina and Glaeser (2004) state that racial attitudes are a primary determinant when clarifying the high levels of inequality in the USA compared to European nations.

The most prevalent income inequality is arguably between the two genders (Pourghadiri, 2012). Regardless of the high levels of inequality in developing nations, literature in the area of gender inequality most prominently concentrates on developed nations (Pourghadiri, 2012). In addition to the frequently cited pay gap between genders Gregory (2009) finds numerous other areas where ones gender can affect income. These may arise in employment participation where social and legal obstacles preclude women from applying for posts. The specific professions which primarily women choose may also affect income inequality as various industries and employment sectors provide diverse payment packages. The average income earned by each gender usually diverges when a woman reaches her child carrying and child caring age. This inequality in income is labelled as "*motherhood penalty*" or "*family gap*" (Gregory, 2009: 293).

2.4.2: Well-Being and Income Inequality Literature Review

Economic empirical evidence has primarily found a negative income inequality coefficient, normally measured by the regional or national Gini coefficient, on self-reported well-being levels. This states that, *ceteris paribus*, individuals living in more unequal nations report, on average, lower well-being levels. Therefore, despite income inequality having some positive effects on well-being, the aggregate impact is normally negative. Morawetz *et al.,* (1977) is one of the first economic papers to use subjective measurements of well-being to study income inequality aversion. Morawetz *et al.,* (1977) compare the self-reported well-being levels of two similar small Israeli villages. The income distribution of these two villages is nearly the only dissimilarity between them. Morawetz *et al.,* (1977) identify that residents of Isos, the more egalitarian village, report higher levels of well-being than the residents of Anisos, the less egalitarian village.

Numerous economic studies are also concerned with preferences for redistribution. This literature is undoubtedly associated with research on individual's aversion towards income inequality (Ferrer-i-Carbonell & Ramos, 2014). However, individual preferences for redistribution are not exclusively determined by dislike towards income inequality (Ferrer-i-Carbonell & Ramos, 2014). Other variables including, trust, state efficacy and state corruption significantly influence redistribution preferences (Alesina & Angeletos, 2005; Di Tella & MacCulloch, 2009). Consequently, preferences for income equality and preferences for redistribution are not perfect substitutes (Ferrer-i-Carbonell & Ramos, 2014). Thus, the relationship between well-being and income inequality determines inequality aversion but does not determine the connected and much researched concept of redistribution preferences. Therefore, the succeeding literature review will not concentrate on literature regarding redistribution preferences. A literature review on redistribution preferences can be read in Alesina and Giuliano (2011). What follows is a comprehensive economic literature review of the well-being-income-inequality relationship in both developed (Subsection 2.4.2.1) and developing nations (Subsection 2.4.2.2).

2.4.2.1: Developed Nations

The use of large sample representative data on subjective well-being, when determining the importance of income inequality on well-being, has only commenced recently (Ferrer-i-Carbonell & Ramos, 2014). Alesina *et al.,* (2004) determine the consequence of national income inequality on individual well-being by employing Euro-Berometer Survey Series (1975-1992) and United States General Social Survey (1972-1997) data. Alesina *et al.,* (2004) identify a negative association between individual well-being and income inequality in Europe and America. Individual income, a set of individual characteristics, year and nation (or state for America) dummies are controlled for. The negative income inequality effect is however, statistically defined more precisely in Europe than in America. Alesina *et al.,* (2004) also find income inequality aversion to relate to individual wealth and left or right wing preferences.

Moreover, Alesina *et al.,* (2004) identify remarkable variations across groups. In America political preferences have no effect. Political preferences have an effect for Europeans, where the negative well-being and income inequality correlation results exclusively from the income inequality aversion of leftist preferences. Alesina *et al.,* (2004) report that in America income inequality aversion is a luxury good as the rich (individuals in the top half of the income distribution) are those identified as being income inequality averse. The poor however, are not affected by income inequality. Alesina *et al.,* (2004) report opposite results for Europe.

Alesina *et al*., (2004) argue that their findings tie in with the perception that Americans have high prospects of moving up and down the income ladder. Europeans however, perceive themselves as residents in a less mobile society. If individuals believe themselves to live in a mobile society, one where personal effort is a significant factor determining income, than income inequality might be seen as fair. Alesina and Angeletos (2005) state that a widespread belief in America exists that effort and not luck, birth situation, or connections, is the chief determinant of income.

Additionally, if American's consider themselves as living in a mobile society, poorer individuals will gain from income inequality while richer individuals will loose from

income inequality. Alesina *et al.,* (2004) state this as a possible reason why rich Americans dislike income inequality while poor Americans do not have an aversion towards income inequality. Alesina *et al.,* (2004) confirm this argument with data from the World Values Survey illustrating that 71% of Americans think that poor individuals have opportunities to escape poverty. In Europe however, this percentage is merely 40%. This is despite the evidence that suggests similar mobility in the USA and in its OECD counterparts (McMurrer & Sawhill, 1998). Alesina *et al.,* (2004) results supports Hirschman and Rothschild's (1973) tunnel effect theory where high prospects of social mobility result in high tolerance for income inequality.

Blanchflower and Oswald (2003) use data from the 1976 to 1996 General Social Survey and report that earnings inequality has a negative but small effect on well-being. Blanchflower and Oswald (2003) results are not completely consistent with the previously discussed results from Alesina *et al.,* (2004). Firstly, Blanchflower and Oswald's (2003) coefficient estimates are extremely small in size. Secondly, an earnings inequality and not an income inequality variable is used. Blanchflower and Oswald (2003) identify that the earnings inequality aversion coefficient is entirely driven by the working, under 30 and low educated (completed fewer than 13 years in education) individuals. This also contradicts the finding of Alesina *et al.,* (2004) that only highly educated individuals have an aversion towards income inequality. Lastly, Blanchflower and Oswald (2003) does not use the Gini coefficient but instead the ratio of the mean of the fifth earnings quintile to the mean of the first earnings quintile. This income inequality measurement used by Blanchflower and Oswald (2003) ignores what occurs in the middle of the earnings distribution.

Ferrer-i-Carbonell and Ramos (2010) use well-being data from numerous waves of the German Socio-Economic Panel and the Gini coefficient as a measure of income inequality. Ferrer-i-Carbonell and Ramos (2010) identify an unambiguous negative effect of income inequality on German's well-being. This finding is consistent with the European results found in Alesina *et al.,* (2004). Ferrer-i-Carbonell and Ramos (2010) test whether individual aversion towards income inequality results from an individual's attitude towards risk. Ferrer-i-Carbonell and Ramos (2010) report a high correlation between attitudes towards income inequality and risk. Individuals who are highly risk averse are also strongly against income inequality, and vice versa. This

finding controls for individual characteristics, such as income, gender and education. This accounts for any bias occurring if individual characteristics are correlated with both risk attitudes and aversion towards income inequality.

O'Connell (2004) determines the interrelationship between GDP per capita, income inequality and mean well-being levels for fifteen EU nations between 1995 and 1998. O'Connell (2004) hypothesises that a larger association may be identified between well-being and income inequality than between well-being and absolute income. O'Connell (2004) identifies a statistically significant negative association between mean well-being levels and income inequality for all four years. Whereas, GDP per capita has a statistically significant association with mean well-being only in 1995.

The empirical analyses of the above economic studies have all shown a negative relationship between well-being and income inequality in developed nations. Other economic studies find discordant results. However, studies that report a positive well-being-income-inequality relationship have a very specific empirical approach and some of these studies have empirical limitations (Ferrer-i-Carbonell & Ramos, 2014).

Sanfey and Teksoz (2007) use World Values Survey data and the Gini coefficient as a measurement of income inequality. Sanfey and Teksoz (2007) identify a negative well-being-income-inequality coefficient for individuals in transition nations and a positive coefficient for individuals in non-transition nations. The regression analysis however, does not include country nor time fixed effects. This is a limitation as the variables included in the regression, such as Gini, GDP, inflation and unemployment, now absorb the effects of the variables not included in the model but which are correlated with the included variables (Ferrer-i-Carbonell & Ramos, 2014). Examples of such non included variables are health, crime, social cohesion, degree of urbanization, the tax system and public expenditure. Thus, the Gini coefficient may be capturing other national characteristics that have a positive correlation with the Gini coefficient (Ferrer-i-Carbonell & Ramos, 2014).

Clark (2003) identifies a positive correlation between well-being and regional inequality when employing British Household Panel Survey data from 1991 to 2002. Clark (2003) interprets this finding as inequality representing opportunity and notes

that results found are consistent with earlier work by Tomes (1986). Tomes (1986) identifies a positive correlation between well-being and inequality for men across Canadian districts. However, Clark (2003) also notes that numerous other studies report a negative well-being-income-inequality correlation.

2.4.2.2: Developing Nations

Less economic empirical literature, when determining the well-being-income-inequality relationship, is concerned with developing nations. All of these developing nation studies do not use panel data. Failing to use panel data, when conducting over time analyses, is a limitation as it will presumably result in biased estimates (Ferrer-i-Carbonell & Frijters, 2004). At best, these studies repeat cross-sectional data analyses when determining the alterations over time in aversions towards income inequality (Ferrer-i-Carbonell & Ramos, 2014).

Graham and Felton (2005) use cross-sectional data of 17 Latin American nations included in the Latinobaro´metro dataset. Predominantly data from the 2004 wave is used. Latin America is cited as the area with the highest world-wide inequality. Graham and Felton (2005) make use of the large cross-country variations in income inequality when approximating the effect of income inequality, measured by the Gini coefficient, on well-being. Graham and Felton (2005) classify nations into three income inequality groups: low (Gini coefficient ≤ 0.5), medium (Gini coefficient = 0.5 - 0.55) and high (Gini coefficient > 0.55). Graham and Felton (2005) find a nonmonotonous well-being-income-inequality relationship. The individuals with the lowest well-being are residents of the highest income inequality nations, followed by those in low income inequality nations. Alternatively, individuals with the highest well-being are those living in medium inequality nations. Graham and Felton (2005) do not offer any explanation for their findings.

Graham and Felton (2005) also identify that inequality causes individuals in the highest income quintile to possess approximately 5% more well-being than the average individual. Whereas, inequality causes individuals in the lowest income quintile to possess approximately 3% less well-being compared to the average individual. These results were shown irrespective of variations in wealth levels within and across these groups. Thus, Graham and Felton (2005) report that in Latin America, inequality signals advantages for the wealthy and disadvantages for the poor. Graham and Felton (2005) acknowledge that, in addition to not having the ability to control for individual fixed effects, their study also has a second limitation through the grouping of nations into three income inequality categories. Through the use of such groupings,

Graham and Felton (2005) cannot reject the possibility that nations in each inequality group have other characteristics in common other than their inequality levels. These common characteristics may cause individuals in each group to report high or low well-being levels instead of from income inequality itself.

In a subsequent study Graham and Felton (2006), using the Latinobaro´metro organization (1997 - 2004) survey, also determine the effect of income inequality on well-being in Latin America. Graham and Felton (2006) find a negative relationship between well-being and income inequality. Graham and Felton (2006) state that inequality appears to signal unfairness in Latin America. The income inequality variable (Gini) is however non-statistically significant (in the text's discussion of results but not in the table).

Senik (2004), using Russian Longitudinal Monitoring Survey data of 4685 Russian individuals (1994 - 2000), determines the effect of income distribution on individual well-being. Senik (2004), in the extremely volatile Russian setting, confirms Hirschman and Rothschild's (1973) tunnel effect theory. Reference group income was identified to exert a positive effect on individual well-being. The income inequality variable (Gini) was however, found to be non-statistically significant.

Literature concerning transition nations is still scarce and quite statistically challenging. Grosfeld and Senik (2010) identify that Poles were fairly tolerant towards income inequality before 1996 after which however, their aversion towards income inequality started to grow. Grosfeld and Senik (2010) state that the years of 1996 and 1997 saw an increase in mistrust in the political system and elites. This, in turn, resulted in the change in opinions concerning income inequality. Grosfeld and Senik (2010) state that income inequality, at the start of the transition period, was perceived as a signal of increasing opportunities. After some time however, individuals became sceptical of the legitimacy of sustaining income inequality. This finding confirms the idea that acceptance towards income inequality depends on how individuals interpret its legitimacy.

Sanfey and Teksoz (2007) use World Values Survey data from 1999 to 2002 and find that individuals living in transition nations with higher income inequality (calculated

by the Gini coefficient) report lower levels of well-being. Thus, individuals living in transition nations are income inequality averse. As data employed by Sanfey and Teksoz (2007) stems from 1999 to 2002, which occurred after the 1996/1997 break, their results confirm those of Grosfeld and Senik (2010). Sanfey and Teksoz (2007) consist however, of an essential limitation that it does not incorporate country or time fixed effects. Therefore, the Gini coefficient may be capturing other national characteristics that are correlated with both the Gini coefficient and well-being. A comprehensive list of economic research, which determines the well-being-income-inequality relationship, is illustrated in Table A2.4.2 in the appendix. As shown these studies overwhelmingly report a negative well-being-income-inequality gradient.

2.4.3: Methodological Issues and Empirical Approach

Numerous methodological issues arise when testing the effect of income inequality on well-being levels. Issues include which regression technique to apply, which regression form to adopt, which income inequality measure to assume, which income threshold level to use when distinguishing between poor and rich nation results and whether the logarithmic specification of income should be assumed. The issues concerning regression technique, income threshold level and logarithmic specification of income may be found in Subsections 2.2.5.1, 2.3.3.1 and 2.3.3.4. The issues concerning regression form and which income inequality measure to assume are discussed in the following subsections.

2.4.3.1: Regression Form

Income inequality remains a contentious area in economics and its effect on individual well-being remains disputed within economic literature (Graham & Felton, 2005). Economic empirical analysis, in this area, primarily measures income inequality by the regional or national Gini coefficient and well-being by self-reported subjective well-being questions from large-scale surveys (Ferrer-i-Carbonell & Ramos, 2014). This well-being data is then used to proxy individual's utility (Ferrer-i-Carbonell & Ramos, 2014). Economic literature, when assessing the well-being-income-inequality relationship, uses an empirical approach based on estimating a well-being function of the following form:

$$WB_{it} = \alpha + \delta 1T + \delta 2R + \gamma X_{it} + \beta 1\, Irt + \beta 2\, Irt\, Z_{it} + \beta 3 Z_{it} + \eta_i + \varepsilon_{it} \quad \textbf{(2.4.3.1)}$$

Where:

WB	=	well-being
i	=	individual
t	=	time
a	=	constant
T	=	time fixed effects
R	=	regional fixed effects
X	=	individual characteristics
I	=	inequality measure
Z	=	variable generating heterogeneity
ηi	=	time constant individual fixed effect
ε	=	error term

The above well-being function normally incorporates fixed effects for region (R) and time (T). The included fixed effects capture the entire unobservable variables specific to time or region such as region and year macro-economic circumstances or regional institutional characteristics. Also included in the well-being function is a set of individual characteristics (X) including health, age, income, relative income, employment and marital status. The well-being equation incorporates an income inequality (I) measure in order to estimate its effect on well-being. Income inequality can fluctuate across time and region if panel data is used. Otherwise, empirical analysis can only exploit regional differences.

Some studies also investigate some kind of heterogeneity on individual aversion to income inequality. These studies empirically estimate whether aversion towards income inequality is alike for various population groups or if this aversion varies depending on variables including individual characteristics or place of residence. Hear a widespread approach is to interact the income inequality (I) variable with the variable creating heterogeneity (Z). When studying the well-being-income-inequality relationship over time the use of panel data is vital as it controls for time constant individual unobservable variables including optimism, intellect, or ability to cope with adversity. Ferrer-i-Carbonell and Frijters (2004) find that incorporating this, constant over time, individual fixed effect (ηi) may significantly alter the estimated coefficients. Thus, excluding these fixed effects bias the results. Lastly, well-being equations include the normal error term (ε).

Income inequality is normally estimated at a regional level and therefore cluster standard errors should be used (Ferrer-i-Carbonell & Ramos, 2014). However, the majority of the economic empirical analyses have too little clusters/regions and therefore clustering might result in biased estimates (Wooldrige, 2010; Angrist & Pischke, 2009; Cameron & Miller, 2010). Due to this economic empirical literature usually decides not to cluster by region. This leads to unbiased coefficient results but statistical inference that might be jeopardised.

When estimating the well-being equation the employed econometric method varies depending on whether the study assumes cardinal or ordinal well-being. If ordinal well-being is assumed, the variations between well-being answers have no specific meaning despite all individuals interpreting well-being in a comparable manner. The distinction between cardinal or ordinal well-being is extremely relevant from a theoretical perspective. However, economic empirical literature finds practically no difference when estimating well-being equations by means of linear or ordered categorical estimators (Ferrer-i-Carbonell & Frijters, 2004). This results in easy comparisons of various surveys regardless of whether cardinal or ordinal well-being is assumed. However, the comparison of studies using panel data and not may be more difficult (Ferrer-i-Carbonell & Ramos, 2014).

2.4.3.2: Measurement of Income Inequality

There are numerous indices for measuring income inequality. When evaluating any income inequality measure there are four important characteristics which should exist. These four principles include: (1) income scale independence, (2) population size independence, (3) additive decomposability and lastly (4) the principle of transfer (Allison, 1978; Cowell, 1995; Cowell & Amiel, 1999; Firebaugh, 2003). All four of these principles must be fulfilled by inequality measurements (Cowell, 1995: 54). What follows is an account of these four principles.

Scale or Mean Independence

If in a specific nation or population all incomes double, then the mean income also becomes twice as large but the income ratio stays constant. The relative variances between units have remained the same. Therefore, inequalities in income are scale or mean independent when income increases or decreases at the same amount for all individuals. As stated by Cowell (1995: 36) "*the measured inequality of the slices of the cake should not depend on the size of the cake*". An inequality measurement must be robust to the selected income scale. Thus, an inequality measurement is scale invariant if it responds to relative instead of absolute variances (Blau, 1977; Allison, 1978).

Population Size Independence

When combining the level of inequality, of a particular nation with *n* amount of individuals, with another nation, which also has *n* persons and equal levels of inequality, the resulting income inequality level should remain constant. As stated by Cowell (1995: 36) "*inequality of the cake distribution should not depend on the number of cake-receivers*".

Additive Decomposability

If every income earner in an economy is categorised into mutually exclusive subgroups, for example nation or region subgroups or factor components such as age, the inequality measure for the total population can be expressed as a weighted sum of the within-group index value and the between-group index value (Firebaugh, 2003: 79). The between-group inequality component is calculated by supposing that all

individuals within a group obtain the mean income for that group and the within-group inequality is derived from a weighted average of inequality in every subgroup though the weights might not necessarily have a sum of one (Cowell, 1995: 151).

Principle of Transfers

Dalton's (1920) principle of transfers reasons that a key characteristic should exist in every inequality measurement. This characteristic states that for any given income distribution, if income is transferred from one individual to a richer individual then income inequality must rise. This principle was initially presented by Pigou (1912) and Dalton (1920) and is also referred to as the Pigou-Dalton condition. There are however, differences in sensitivity to income transfers at different points on the income ladder (Atkinson, 1970). An index is, for example, equally sensitive to transfers at all income levels. Thus, a reallocation of €100 from an individual with an income of €1,000 to another with €2,000 is equally sensitive or has the same effect as a transfer of €100 from an individual earning €10,000 to another making €11,000 (Allison, 1978). In both situations the variance between the two individual's income levels are identical i.e. €1000. Nevertheless, income transfers at the top of the income ladder are not as significant as the same transfers at the bottom of the income ladder (Firebaugh, 2003). Hence, income gains at lower levels of income produce higher well-being than do income improvements at higher levels of the income distribution (Firebaugh, 1999).

When adopting Dalton's (1920) principle of transfers criterion Allison (1978) states that only a small number of valid income inequality measurements exist. These valid measures include the Gini coefficient, the coefficient of variation, Theil's Index of Inequality and Atkinson's measure.

Champernowne (1974) however, finds that the coefficient of variation is most sensitive to inequality of extreme wealth. This yields a "flat" response to transfers. Consequently, this measurement is not as useful when calculating income inequality compared with other measurements (Allison, 1978: 869). Therefore, the following subsection will concentrate on the remaining three inequality measurements: the Gini coefficient, Theil's index of inequality and Atkinson's measure.

2.4.3.2.1: The Gini Coefficient

The Gini coefficient is the most frequently used indicator of income inequality (Sen, 1973; Cowell, 1977). Indeed, except very few exemptions, economic literature on well-being and inequality use the Gini coefficient at the regional or national level as the measurement of inequality (Ferrer-i-Carbonell & Ramos, 2014). The widespread use of the Gini coefficient makes it an essential inequality measurement in national studies, as it allows for a basis of comparison with other nations. The Gini coefficient is a suitable specification of inequality as defined by Blau (1977). Blau (1977) claims that inequality is a central trait of all graduated social parameters and defines inequality as the mean status between any two individuals relative to the mean status.

As stated by Cowell (1995) the Gini coefficient (G) is calculated as follows:

$$G = \frac{1}{2N^2\bar{Y}} \sum_{i=1}^{N} \sum_{j=1}^{N} |y_i - y_j| \qquad \textbf{(2.4.3.2.1a)}$$

The Gini coefficient is equal to half of the mean distance between the income ratios for all pairs of observations. Two observations (individuals) are randomly selected with replacement from the whole population. Half of the distance between the observation's income ratios is derived. This method is completed M times and the average is taken (Firebaugh, 2003). Every observation has a probability of 1/N of being selected. The Gini coefficient in equation 2.4.3.2.1a is un-weighted. However, when the basic observations are individuals this index is also weighted. The Gini coefficient may be stated as a value ranging from 0 depicting perfect equality to 1 (or $\frac{N-1}{N}$) depicting perfect inequality.

Shankar and Shah (2003) calculate the weighted Gini coefficient ($G_{W)}$ as follows:

$$G_W = \frac{1}{2\bar{Y}} \sum_i \sum_j |y_i - y_j| p_i p_j \qquad \textbf{(2.4.3.2.1b)}$$

The mathematical representation of the Gini coefficient is associated to the covariance between the income of an individual Y, the rank of the individual in the distribution F, and the average income (Bellù & Liberati, 2006b).

$$Gini = 2cov(Y, F)/\bar{y} \qquad \textbf{(2.4.3.2.1c)}$$

Where:

Y	=	individual income
F	=	income rank in the distribution (0 = poorest and 1 = richest)
$\bar{y}$	=	mean income

The calculation of the Gini coefficient may be derived from the Lorenz curve framework (Sen, 1973) displayed in Figure 2.4.3.2.1.The Lorenz curve is an aid when explaining the concept more visibly (Lui, 1997). The Lorenz curve is a graphical method of illustrating the cumulative portion of total income occurring in consecutive income intervals (Kawachi & Kennedy, 1997). In a completely equal nation the least well off 25% of the population would make 25% of the total income and the least well off 50% of individuals would earn 50% of the total income etc. (De Maio, 2007). In this situation, where incomes are equally dispersed, the Lorenz curve will follow the 45° diagonal (Kawachi & Kennedy, 1997). However, as the level of inequality raises so does the curvature of the Lorenz curve. Thus, in a nation where inequality exists the Lorenz curve deviates from the 45° line of perfect equality (De Maio, 2007). Therefore, the least well off 25% of the population may receive 10% of total national income.

An appealing characteristic of this framework is that it may be used to calculate a single summary statistic of income distribution in a nation: the Gini coefficient (De Maio, 2007). The Gini is derived as the ratio of the area between the Lorenz curve and the 45° line, to the entire area below the 45° line (Kawachi & Kennedy, 1997). In Figure 2.4.3.2.1 the Gini coefficient is defined as:

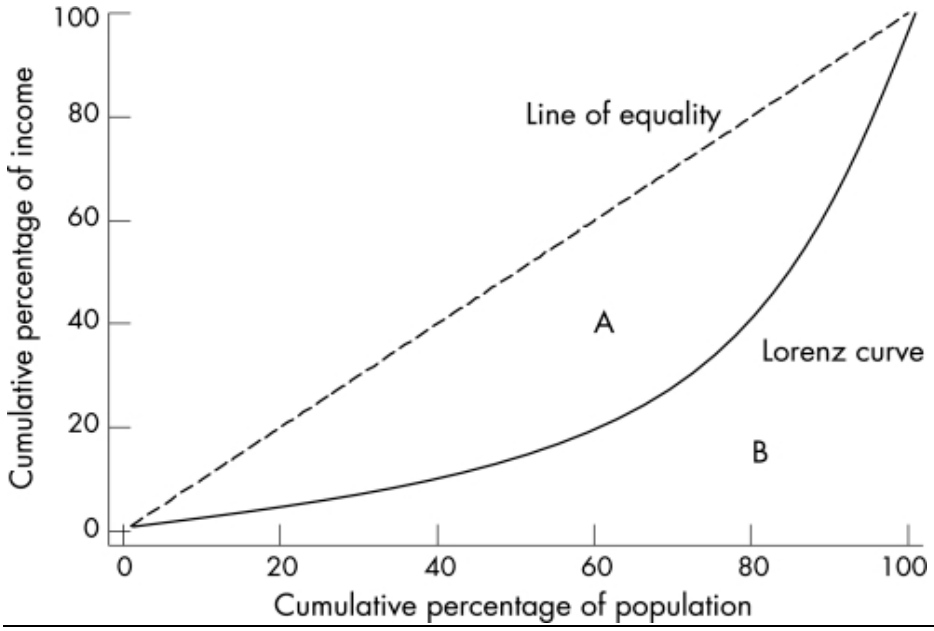
$$G = \frac{Area(A)}{Area\ (A) + Area\ (B)} \qquad \textbf{(2.4.3.2.1d)}$$

In a nation with no income inequality (every individual has the same income), no area exists between the 45 degree line of equality and the Lorenz curve (Area(A) = 0). For a nation with total inequality (one individual earns all the income), the Lorenz curve

will overlap with the straight lines at the bottom and right margins of the curve (Area(B) = 0).

The Gini coefficient is the most frequently used indicator of income inequality (Sen, 1973; Cowell, 1977). The chief advantage of using the Gini coefficient as a measure of inequality is that it includes all available information and it permits comparisons between various nations and societies, irrespective of their size or structure. Nevertheless, this index has some limitations. Though it fulfils the principle of transfers (Cowell, 1995), it does not comply with the welfare principle, which states that income transfers are more significant at lower income levels (Firebaugh, 2003). The Gini coefficient is also not additively decomposable (Bourguignon, 1979). Technicllly the Gini coefficient is more difficult to calculate than the mejority of other inequality measures. One underpinning featur of the Gini coefficient is that it offers non-redundant data on income inequality. This results as the Gini coefficient is relatively more sensitive to variations which occur around the median of the income distribution and not as affected by transfers taking place among the top or bottom of the income ladder (Allison, 1978; Firebaugh, 2003).

Figure 2.4.3.2.1: The Lorenz Curve



(Source: De Maio, 2007:850)

2.4.3.2.2: Theil Index of Income Inequality

Theil (Theil, 1972; Theil & Finizza, 1971) reports that raw entropy scores fail to be an adequate measurement of inequality and establishes numerous indexes founded on the entropy measure. Theil (1967) proposes the so called Theil index which is a decomposable inequality measurement based on the lorenz curve which allows the comparison of between group and within group inequality (Cowell, 1980). The Theil index may be written as follows:

$$I = \frac{1}{N}\sum_{i=1}^{N}\frac{xi}{\bar{x}}log\frac{xi}{\bar{x}} \qquad \textbf{(2.4.3.2.2)}$$

Where:

I	=	income inequality
N	=	nation
xi	=	individual or group income of individual of group *i*
$\bar{x}$	=	average income of nation N

If all individuals or groups have equal amounts of income (all receive the mean income level) no inequality exists and I is 0. The Theil index calculates the variation between the observed distribution and the mean.

A beneficial trait of the Theil index is being additive across various subgroups or regions in the nation. Osberg (1984) however, determines that the Theil index is comparable to the Gini coefficient in that it is too sensitive to variations in the middle part of the income distribution. Furthermore, underestimation resulting from shifts in the quantity of income groups employed to compute the measurement is far larger then with the Gini coefficient (Murphy, 1985). Finally, the Teil index is founded upon a Lorenz derivation, and thus it is susceptible to the issue of intersecting Lorenz curves when dissimilar geographic areas are compared.

2.4.3.2.3: Atkinson's Measure of Inequality

Anthony Barnes Atkinson initially established the Atkinson index in 1970 (Atkinson, 1970). The Atkinson (1970) index, denoted here as A, is defined as follows:

$$A = 1 - (\sum_i p_i \, r_i^{1-\varepsilon})^{\frac{1}{1-\varepsilon}} \qquad \textbf{(2.4.3.2.3)}$$

Here the parameter ε ($\varepsilon > 0$) signifies the relative sensitivity of the Atkinson index to transfers at various points on the income ladder. Consequently, the higher the parameter ε, the larger the weight allocated to the poorer end of the income distribution (Firebaugh, 1999). Thus, as ε rises, the Atkinson index increases its sensitivity to transfers among relatively poor individuals and becomes less sensitive to transfers among high income recipients (Allison, 1978). The distance concept of the Atkinson index is calculated in relation to the variations in marginal social utilities (Cowell, 1995). The Atkinson index is not dependent on income scale or size of the population and the total between-group and within-group components precisely equals total inequality (Cowell, 1995). Lastly, the Atkinson index diverges from 0 (perfect equality) to $1 - N^{-\varepsilon/1-\varepsilon}$. As N rises the upper bound of the Atkinson index approaches 1.0.

2.4.4: Section Conclusion

Studies concerned with the relationship between subjective well-being and income inequality have been partially inspired by the vast literature on well-being and income (Verme, 2011). Easterlin (1974) founded the economics of well-being in the 1970s and finds that, while average reported well-being levels disclose significant variances within countries, they fail to have a strong correlation with average levels of national income. The Easterlin paradox refers to this contradiction: that average national well-being is unrelated to GDP per head while at the micro level, individual well-being and income are positively related. The search for an explanation of the Easterlin paradox has led to the formulation of several theories most of which focus on the role of the reference income (Verme, 2011). Individuals evaluate their income relative to the incomes of a reference group (Ferrer-i-Carbonell, 2005). When applying the importance of reference income to the context of income inequality, opposite predictions about the impact of inequality on subjective well-being may result (Verme, 2011).

On the one side the tunnel effect theory by Hirschman and Rothschild (1973) states that individuals may value inequality if it indicates social mobility. Furthermore, national income inequality has been stated as an essential condition to generate incentives for economic activity and competitiveness (Clark, 2003; Alesina *et al.*, 2004; Verme, 2011). Indeed, economic policy of freedom and entrepreneurship may result in an increase in income inequality. However, such economic policy is also believed to result in greater economic affluence and a perception of individual accountability for economic achievement in residents (De Haan & Sturm, 2000).

From the tunnel effect theory's perspective, income inequality may result in greater individual well-being. On the contrary, the relative deprivation theory by Runciman (1966) predicts that growth in income inequality will result in a rise in relative deprivation and a fall in individual well-being. Furthermore, high income inequality is associated with low social trust and division within society (Gustavsson & Jordahl, 2008). Additionally, it is related with social problems including poverty, deprivation, high crime rates (Beja, 2011) and a contradiction of basic ideas of justice (Alesina *et al.*, 2004). Individuals may also have an aversion towards income inequality if they

believe that in a more equal society they would be better off (Piketty, 1995; Bénabou & Ok, 2001). Thus, from the relative deprivation theory's perspective income inequality is likely to result in lower individual well-being.

The vast quantity of economic empirical research finds that individuals are averse to income inequality. The availability of self-reported well-being data of national representative surveys have enabled the testing of whether income inequality affects individual well-being from numerous nations with diverse macroeconomic and socio-political conditions. Economic empirical analysis in this area, primarily measures well-being by self-reported subjective well-being questions from large-scale surveys (Ferrer-i-Carbonell & Ramos, 2014). This well-being data is then used to proxy individual utility (Ferrer-i-Carbonell & Ramos, 2014).

The Gini coefficient is the most frequently used indicator of income inequality (Sen, 1973; Cowell, 1977). Indeed, except very few exemptions, economic literature on well-being and inequality use the Gini coefficient at the regional or national level as the measurement of inequality (Ferrer-i-Carbonell & Ramos, 2014). The widespread use of the Gini coefficient makes it an essential inequality measurement in national studies, as it allows for a basis of comparison with other nations. The Gini coefficient is a suitable specification of inequality as defined by Blau (1977). Blau (1977) claims that inequality is a central trait of all graduated social parameters and defines inequality as the mean status between any two individuals relative to the mean status.

2.5: Chapter Conclusion

The understanding of the well-being-income relationship is underpinned by a vast quantity of economic literature. Easterlin (1974) pioneered the economics of well-being in the 1970s. Easterlin (1974; 1995; 2001) finds that well-being levels across individuals within a specified nation fluctuate directly with income. Indeed, a clear consensus has emerged within the literature (Stevenson & Wolfers, 2008). This consensus states that regressions of well-being on income, using cross-sectional survey data from a particular nation (including or excluding standard demographic controls) illustrate significant positive income coefficient estimates. Therefore, within a particular nation richer individuals report higher levels of well-being than poorer individuals. Diversely, Easterlin (1974) identifies that national income increases do not result in greater national well-being levels. However, subsequent studies based on across nation well-being-income data report mixed results (Stevenson & Wolfers, 2008).

Numerous explanations, for the apparent opposing, within and across nation, results have been suggested. Easterlin (1974) states that these contradicting results show consistency with the hypothesis that relative income is far more significant than absolute income when determining individual well-being levels. Relative income is the distance between one's own income to the income of a reference group (Ferrer-i-Carbonell, 2005). Numerous other empirical results find that well-being is determined by the discrepancy between absolute and relative income (Senik, 2004). This theory of relative income specifies that an individual's well-being depends not only on absolute income but also on relative income. When national economic activity increases, individual incomes and reference incomes increase at comparable rates resulting in little or no variation amongst the two and thus, aggregate well-being levels remain constant.

Numerous economists have studied the within country relationship between individual well-being and income. A clear consensus has emerged within the literature (Stevenson & Wolfers, 2008). This consensus states that regressions of well-being on income, using cross-sectional survey data from a particular nation, reveal significant positive income coefficient estimates. Therefore, within a particular nation richer

individuals report higher levels of well-being than poorer individuals. No literature has been identified that contradicts this positive relationship.

Few economic empirical analyses, when focusing on well-being and income, account for reference group income. Studies which do so include Clark and Oswald (1996), Kapteyn *et al.,* (1997), Van de Stadt *et al.,* (1985), McBride (2001) and Ferrer-i-Carbonell (2005). These studies all report reference group income as having a negative effect on individual well-being. The effect of relative income on well-being has been studied by a number of economists (Dolan *et al.,* 2008). Findings report a positive relative income impact on well-being. Thus, the richer individuals are compared to their reference group the happier they will be.

Numerous empirical issues arise when testing the importance of absolute, reference and relative income on individual well-being. These issues include which regression form and empirical approach to adopt.

Well-being variables are regarded as categorical and ordinal in nature (Ferrer-i-Carbonell & Frijters, 2004). Variables with ordinal levels of measurement are, as well as being mutually exclusive categories, ordered categories from low to high. However, the intervals between the various categories are not precise or equal (Leech *et al.*, 2008). The literature employs ordered probit models for several reasons. Firstly, the ordered probit model does not assume that a rise in subjective well-being from "not at all happy" to "not very happy" is identical to a rise from "quite happy" to "very happy" (McBride, 2001). Secondly, an ordered logit model assumes that the ε i is logistically distributed whereas the ordered probit model assumes that the ε i is normally distributed (Borooah, 2002). Greene (2000) argues that the justification of one distribution over the other is problematic on theoretical grounds. Researchers however, commonly assume a normal distribution when the true distribution is unknown (Greene, 2000). Lastly, subjective well-being measurements have an inherent ordering which is not accounted for when using a standard multinomial probit model (McBride, 2001). Ordered probit models account for this inherent ordering.

In order to test the various hypotheses regarding the influence of own income and peer group income on well-being the empirical analysis, of Ferrer-i-Carbonell (2005) is

based on various specifications of equation (2.5a). The subsequent relation is anticipated for each individual *i* at a particular (constant) time *t*.

$$WB = SWB\ (y, y_r\ , X) \qquad \textbf{(2.5a)}$$

Where:

WB	=	the economic concept of welfare or well-being
y	=	absolute family income
y_r	=	reference group income
X	=	the vector of variables including individual and household socio-economic and demographic characteristics

The first specification is one which includes, in addition to *X*, merely family income as a determinant of subjective well-being (Ferrer-i-Carbonell, 2005). A collective theory in economics is a positive well-being family income (y) relationship (Easterlin, 2001). Frequently, the individual well-being function is thought to be concave in income and, subsequently, income is presented in logarithmic form (Deaton, 2008).

To test whether reference group income results in a negative effect on individual well-being the specification includes, in addition to *X*, family income and reference group income as determinants of subjective well-being (Ferrer-i-Carbonell, 2005). Reference income, y_r, is expected to have a negative correlation with individual well-being (Ferrer-i-Carbonell, 2005).

A third specification assumes that well-being depends on the distance between the individual's own and the reference group income. This is completed by including the difference between the logarithm of own income and the logarithm of the average income of the reference group (Ferrer-i-Carbonell, 2005). Relative income is anticipated to have a positive impact on well-being (Caporale *et al*., 2009).

An alternative explanation for the seemingly conflicting Easterlin (1974) findings is the modified Easterlin hypothesis. This hypothesis states that upon obtaining a particular income level, enabling the consumption of basic needs, raising income further no longer results in greater well-being. Thus, raising income does not increase well-being ad infinitum as increases in well-being tail off as absolute income rises

(Frey & Stutzer, 2002b). This hypothesis assumes that once an individual's basic material needs are satisfied, non-material wealth such as health and religion primarily determines an individual's well-being. This hypothesis coincides with the theory of diminishing marginal utility of consumption and income which is characterised by the neoclassical theory of utility.

A clear consensus of the existence or magnitude of the modified Easterlin hypothesis has not been reached. Statements regarding the existence of a satiation point were made by a number of economists. Layard (2003), Frey and Stutzer (2002a) and Layard (2005a) all claim such an existence when conducting visual analysis of a scatter plot depicting GDP per capita on the horizontal axis and well-being on the vertical axis. However, these visual scatter plot examinations, of the well-being-income relationship, are of limited use (Frey & Stutzer, 2002a). Despite vast claims of the existence of such a satiation point no study finds official statistical evidence to support it (Stevenson & Wolfers, 2013). Indeed other economic studies report statistical evidence of no satiation point after which the positive well-being-income relationship flattens out (Stevenson & Wolfers, 2008). These studies include Stevenson and Wolfers (2008), Stevenson and Wolfers (2013), Deaton (2008) and Sacks *et al.,* (2010).

Testing the modified Easterlin hypothesis involves an analysis of the existence of a particular income level beyond which a change in the well-being-GDP relationship occurs. This is achieved through the estimation of separate "rich nation" and "poor nation" regressions (Stevenson & Wolfers, 2013). The measure of economic development is the log of GDP per capita based on PPP (Stevenson & Wolfers, 2013). "Rich" nations are defined as those with per capita income in excess of $15,000 and "poor" nations as those with per capita income of less than $15,000 (Layard, 2003).

The empirical assessment of the Easterlin hypothesis comes from regressions of the following form (Stevenson & Wolfers, 2013):

$$WB_n = \alpha + \beta poorI(GDP_n < k) \times (log(GDP_n) - log(k)) + \beta richI(GDP_n \geq k) \times (log(GDP_n) - log(k)) + \varepsilon_n \quad \textbf{(2.5b)}$$

Where:

WB	=	dependent variable namely well-being
n	=	nation
a	=	constant
βpoor	=	well-being-income gradient for "poor" nations (GDP<$k)
βrich	=	well-being-income gradient for "rich" nations (GDP≥$k)
GDP	=	GDP per capita
k	=	cut of level of GDP per capita
ε	=	error term

The coefficients on the explanatory variables are the interaction of log per capita GDP with a dummy variable depicting if per capita GDP is over or under a cut of level, $k ($15,000) (Stevenson & Wolfers, 2013). The functional form, when calculating log(GDP) relative to a threshold income, permits for a shift in the well-being-income gradient once per capita GDP surpasses the particular threshold (Stevenson & Wolfers, 2013). This specification enables two variations of the modified Easterlin hypothesis to be tested. Firstly, whether beyond a particular threshold of basic needs, income is uncorrelated with well-being (βrich = 0) and secondly, whether the well-being-income relationship determined for poor nations differ from that determined for rich nations (βpoor > βrich) (Stevenson & Wolfers, 2013).

Another cited explanation for the apparent contradictory Easterlin (1974) results stems from the effect that income inequality has on well-being. A negative well-being-income-inequality relationship is found by early economic literature (Morawetz *et al*., 1977). However, recent research finds diverse empirical results when determining the extent and whether income inequality affects subjective well-being (Alesina *et al.*, 2004; Graham & Felton, 2006; O'Connell, 2004). A common justification states that income inequality may be an indication of income mobility and available opportunities as well as being an indication of injustice (Graham & Felton, 2005).

On the one side the tunnel effect theory by Hirschman and Rothschild (1973) states that individuals may value inequality if it indicates social mobility. Furthermore, national income inequality has been stated as an essential condition to generate incentives for economic activity and competitiveness (Clark, 2003; Alesina *et al.*, 2004; Verme, 2011). Indeed, economic policy of freedom and entrepreneurship may result in an increase in income inequality. However, such economic policy is also

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The vast quantity of economic empirical research finds that individuals are averse to income inequality. The availability of self-reported well-being data of national representative surveys has enabled the testing of whether income inequality affects individual well-being from numerous nations with diverse macroeconomic and socio-political conditions. Economic empirical analysis in this area, primarily measures income inequality by the regional or national Gini coefficient and well-being by self-reported subjective well-being questions from large-scale surveys (Ferrer-i-Carbonell & Ramos, 2014). This well-being data is then used to proxy individual utility (Ferrer-i-Carbonell & Ramos, 2014).

Economic literature, when assessing the well-being-income-inequality relationship, uses an empirical approach based on estimating a well-being function of the following form:

$$WB_{it} = \alpha + \delta 1T + \delta 2R + \gamma X_{it} + \beta 1\, Irt + \beta 2\, Irt\, Z_{it} + \beta 3 Z_{it} + \eta_i + \varepsilon_{it} \quad \textbf{(2.5c)}$$

Where:

WB	=	well-being
i	=	individual

t	=	time
a	=	constant
T	=	time fixed effects
R	=	regional fixed effects
X	=	individual characteristics
I	=	inequality measure
Z	=	variable generating heterogeneity
ηi	=	time constant individual fixed effect
ε	=	error term

The above well-being function normally incorporates fixed effects for region (R) and time (T). The included fixed effects capture the entire unobservable variables specific to time or region such as region and year macro-economic circumstances or regional institutional characteristics. Also included in the well-being function is a set of individual characteristics (X). The well-being equation incorporates an income inequality (I) measure in order to estimate its effect on well-being. Income inequality can fluctuate across time and region if panel data is used. Otherwise, empirical analysis can only exploit regional differences.

Many studies, despite having two distinct meanings, use the term happiness and life satisfaction interchangeably (Gerdtham & Johannesson, 2001; Frey & Stutzer, 2000a; Ferrer-i-Carbonell, 2005). Indeed, much of the to-date economic literature also uses data on life satisfaction and happiness interchangeably when evaluating subjective well-being. Justifications in doing so primarily state the high correlation and similar covariates that these two measures of well-being possess (Stevenson & Wolfers, 2008). However, studies that concern themselves with this issue have reported distinctions between the two definitions. These studies indicate the importance of distinguishing between the two definitions of well-being. Those empirical studies who fail to do so may be obtaining incomplete results.

CHAPTER 3
DATA

The aim of this thesis is to explore the possible explanations of the apparent contradictory results provided by Easterlin (1974) by using cross sectional data of European residents obtained from the 2008 wave of the EVS. Easterlin (1974) pioneered the economics of well-being in the 1970s and finds that although average reported well-being levels reveal significant differences within countries, they do not have a strong correlation with average levels of national income. The aim of this thesis is achieved by estimating the well-being-income relationship in many different ways. Firstly, Chapter 4 presents an empirical analysis of the importance of absolute, reference and relative income on individual well-being levels in Ireland. Secondly, Chapter 5 examines the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe. Thirdly, Chapter 6 assesses the effect of income inequality on well-being levels in Europe.

This chapter consists of a description of the data used in this thesis. The primary data source used, when determining the well-being-income relationship, is the 2008 wave of the EVS. Section 3.1 contains a detailed description of the EVS. Section 3.2 depicts an overview of the EVS well-being variable. Section 3.3 is comprised of a comprehensive account of the EVS 2008 Irish data. Section 3.3 focuses primarily on happiness and life satisfaction (Subsection 3.3.1) and well-being and household income (Subsection 3.3.2) EVS 2008 Irish data. The descriptive statistics, when estimating the effect of absolute, reference and relative income on individual well-being levels in Ireland, are depicted in Subsection 3.3.3.

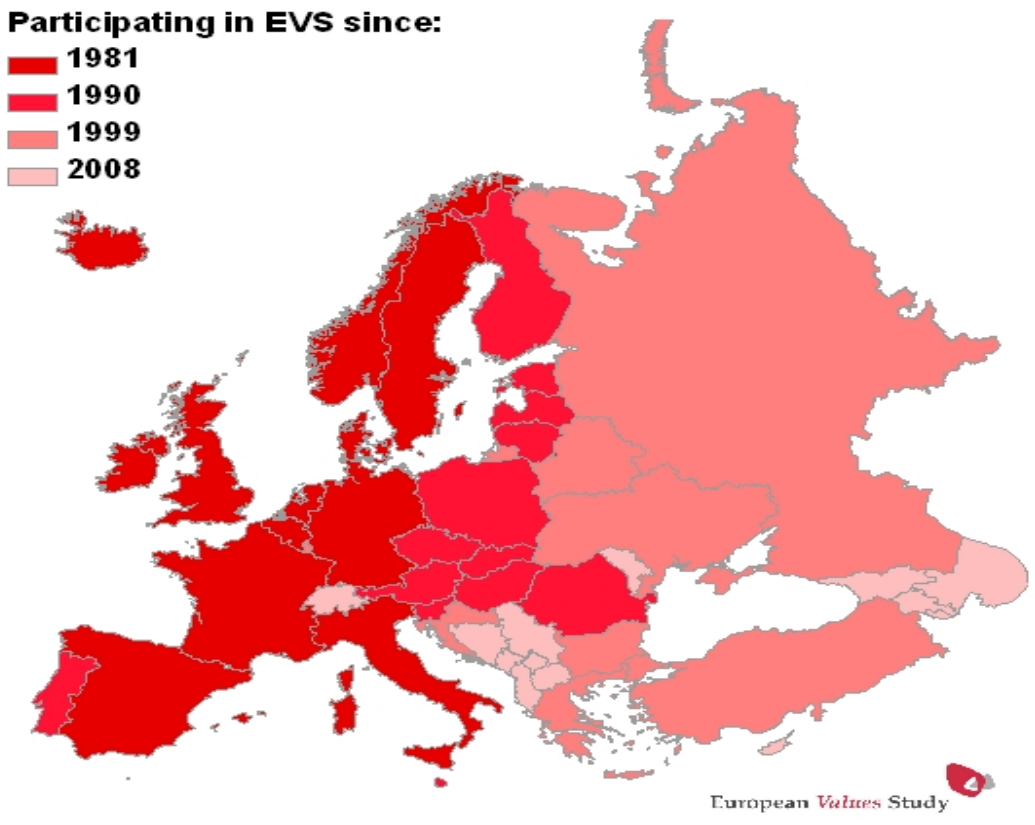
Section 3.4 concerns itself with EVS 2008 integrated data. Section 3.4 primarily describes happiness and life satisfaction (Subsection 3.4.1), well-being and household income (Subsection 3.4.2) and well-being and national income (Subsection 3.4.3) 2008 integrated EVS data. The descriptive statistics, when examining the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe, are depicted in Subsection 3.4.4.
This is followed by Section 3.5 which is predominantly concerned with the national income inequality variable. Subsection 3.5.1.1 concentrates on happiness and income

inequality data while Subsection 3.5.1.2 focuses on life satisfaction and income inequality data. The descriptive statistics, when assessing the effect of income inequality on well-being levels in Europe, are depicted in Subsection 3.5.2. This chapter is concluded in Section 3.6.

3.1: European Values Study

The EVS is a large-scale, cross-national survey research program which concerns itself with human values (EVS, 2011). In particular it provides insight into the opinion's on family, work, religion, politics and society of European citizens. The study was initiated by the European Value System Study Group in the late 1970s and has become an established network of social and political scientists working on data creation and processing (EVS, 2011). The EVS is to date, the most inclusive European research project on human values. The EVS is conducted every nine years. To date the following four EVS waves exist: 1981(16 nations), 1990 (29 nations), 1999/2000 (33 nations), and 2008 (47 nations). The participating nations, in each of the four waves are graphically illustrated in Figure 3.1 and listed in Table 3.1.

Figure 3.1: Participating Nations in the European Values Study 1981-2008



(*Source: EVS, 2011*)

Table 3.1: Participating Nations in the European Values Study 1981-2008

Nation	1981 Wave	1990 Wave	1999 Wave	2008 Wave
USA	1982	1990		
Canada	1982	1990		
Belgium	1981	1990	1999	2009
Denmark	1981	1990	1999	2008
France	1981	1990	1999	2008
Germany	1981 (West-Germany)	1990	1999	2008/2009
Great Britain	1981	1990	1999	2009/2010
Iceland	1984	1990	1999	2009/2010
Ireland	1981	1990	2000	2008
Italy	1981	1990	1999	2009
Malta	1984	1991	1999	2008
Netherlands	1981	1990	1999	2008
Northern Ireland	1981	1990	1999	2008
Spain	1981	1990	1999	2008
Sweden	1982	1990	2000	2009/2010
Norway	1982	1990		2008
Austria		1990	1999	2008
Bulgaria		1991	1999	2008
Czech Republic		1991	1999	2008
Estonia		1990	1999	2008
Finland		1990	2000	2009
Hungary		1991	1999	2008/2009
Latvia		1990	1999	2008
Lithuania		1990	1999	2008
Poland		1990	1999	2008
Portugal		1990	1999	2008
Romania		1993	1999	2008
Slovak Republic		1991	1999	2008
Slovenia		1992	1999	2008
Belarus			2000	2008
Croatia			1999	2008
Greece			1999	2008
Luxembourg			1999	2008
Russian Federation			1999	2008
Turkey			2001	2008/2009
Ukraine			1999	2008
Albania				2008
Armenia				2008
Azerbaijan				2008
Bosnia and Herzegovina				2008
Cyprus				2008
Northern Cyprus				2008
Georgia				2008
Kosovo				2008
Republic of Macedonia				2008
Republic of Moldova				2008
Republic of Montenegro				2008
Serbia				2008
Switzerland				2008

(Source: Author's own)

3.2: European Values Study-Well-Being Data

This thesis defines well-being as an individual's evaluation of their own life regarded as a whole (Sarracino, 2013). This definition includes both positive and negative evaluations (Diener, 2006). This thesis defines happiness and life satisfaction similar to the definitions used by Helliwell (2003). According to Helliwell (2003) data on happiness may indicate brief periods of joy and may be responsive to short-term circumstances. Life satisfaction data however, tends to characterise an underlying state of well-being (Helliwell, 2003). Life satisfaction data is attained from the EVS question which reads as follows: "*How satisfied are you with your life*?" This refers to the overall cognitive evaluation of an individual's own life. Happiness data is acquired from the succeeding EVS question*: "All things together how happy are you?"* This refers to immediate positive or negative emotions experienced by an individual when considering all aspects of their life.

Interviewees were asked to rank their happiness and life satisfaction levels and thus, this measurement of well-being is regarded as that of an ordinal ranking (Ferrer-i-Carbonell & Frijters, 2004). The four various happiness levels and 10 various life satisfaction levels are ranked as it is known which well-being category is highest or more preferred on a dimension. It is therefore, assumed that individuals share a mutual opinion of what well-being is (Ferrer-i-Carbonell & Frijters, 2004). However, the intervals between the various well-being categories are not precise or equal (Leech *et al.*, 2008).

The ordered nature of the well-being variables justify the use of the ordered probit models used in the results chapters of this thesis. This is consistent with ordered probit models used by Clark and Oswald (1994), Plug (1997), Ferrer-i-Carbonell (2005), Frey and Stutzer (1999; 2000a), Hartog and Oosterbeek (1998), Litchfield *et al*., (2012), McBride (2001), Van Praag *et al*., (2003) and Wottiez and Theeuwes (1998) when estimating the determinants of well-being.

3.3: Variables used when Estimating the Effect of Absolute, Reference and Relative Income on Individual Well-Being Levels in Ireland

When determining the importance of absolute, reference and relative income on individual well-being in Ireland, 2008 Irish data from the EVS is used. One thousand and thirteen valid interviews were conducted through face-to-face interviews with a standardized questionnaire.

When obtaining the EVS 2008 Irish data a severe sampling procedure was followed. Those interviewed included persons eighteen years or older who were residents within private households in Ireland, regardless of nationality, citizenship or language.

Since 2004 local authorities in the Republic of Ireland are lawfully required to maintain two versions of the Register of Electors. Firstly, the full version contains the details of individuals who are entitled to vote. This information is merely available for electoral or other statutory purposes (EVS, 2011). Secondly, the edited version excluding individuals who previously requested that their details may not be made available to third parties. The edited register may be comprised of as little as 8% of the full register. Consequently, selecting respondents in the Republic of Ireland by using named individuals or addresses from the register would not be adequate. Subsequently, TNS mrbi adopted a multi-stage, random probability approach which can be compared to that used for Eurobarometer surveys (EVS, 2011).

This approach entailed the random selection of 167 sampling points from TNS mrbi's master sampling frame in the Republic of Ireland (EVS, 2011). These points were established in proportion to the population of adults aged 18 years and older. Thus, if 30% of the adult population lived in the midland area then approximately 30% of the sampling points occurred in the midland area. Interviewers were supplied with a starting address for each sampling point and instructed to attain six interviews at each point. The selection procedure was a combination of random route and next birthday procedures.

The random route procedure firstly involved interviewers visiting the provided start address. When the first interview was concluded or if no suitable respondent lived at

this address, interviewers selected the next household using TNS mrbi's standard random route procedure. This involved selecting every fifth house or, the house at every quarter of a mile in rural areas, on the left hand side of the street. This was followed by a zig-zag route within the sampling point or District Electoral Division. Secondly, using the next birthday selection procedure interviewers, upon identifying the participating households, merely interviewed the individual in each household with the next birthday. Only this individual qualified to take part in the survey. If the target respondent was unavailable, the interviewer made at least four return visits in order to secure an interview. A comprehensive description of the EVS 2008 Irish survey is illustrated in Table A3.3 in the appendix.

3.3.1: Happiness and Life Satisfaction

The empirical analysis of the effect of absolute, reference and relative income on individual well-being levels in Ireland is founded on the survey results of the Irish 2008 wave of the EVS. The dependent variable is based on the subjective, self-reported measure of well-being namely, happiness and life satisfaction.

3.3.1.1: Happiness

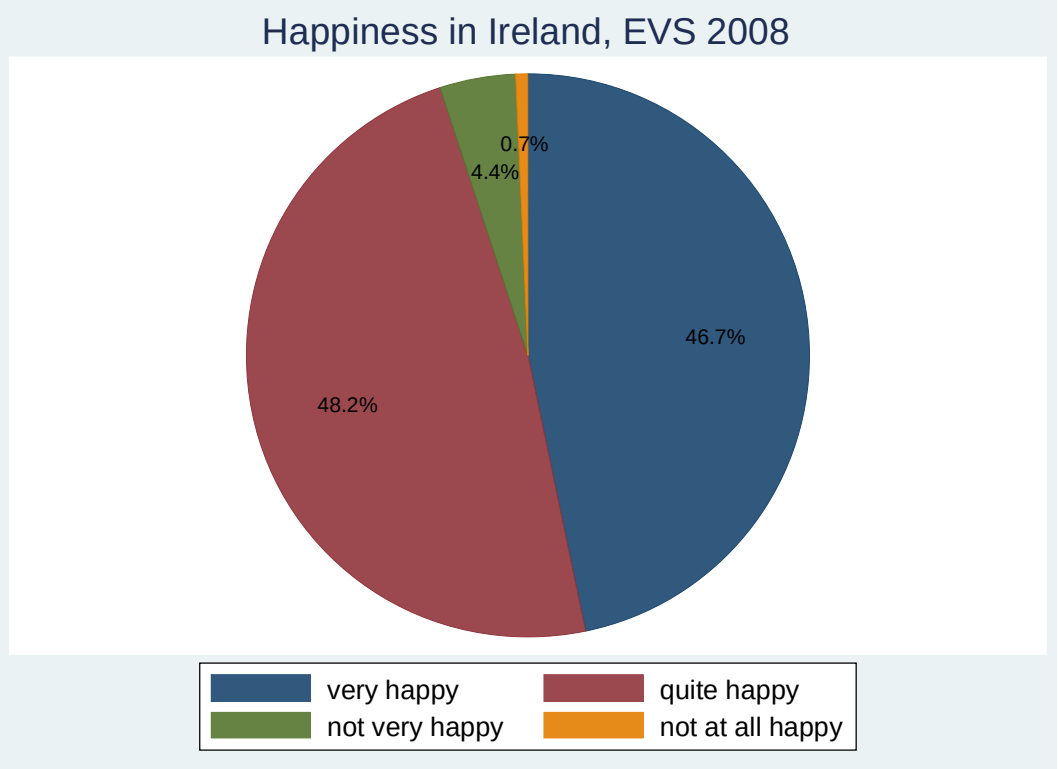
When estimating the effect of absolute, reference and relative income on individual well-being levels in Ireland the dependent variable "happiness" concerns itself with the self-reported republic of Ireland answers to the 2008 EVS question which reads as follows *"Taking all things together how happy are you?"* Interviewees ranked their responses on an ordered scale, with the option of choosing "not at all happy", "not very happy", "quite happy" or "very happy". A total of 1,010 individuals determined what happiness level they fell into. The distribution of self-reported happiness levels in Ireland 2008 are shown in Table 3.3.1.1 and Figure 3.3.1.1. The sample mean for the dependent variable happiness is 3.4 with a min of 1 and a max of 4.

Table 3.3.1.1: Self-Reported Levels of Happiness in Ireland, EVS 2008

Taking all things together how happy are you?	Absolute frequency	Percentage
Very happy	472	46.73%
Quite happy	487	48.22%
Not very happy	44	4.36%
Not at all happy	7	0.69%

(Source: Author's own)

Figure 3.3.1.1: Self-Reported Levels of Happiness in Ireland, EVS 2008



(Source: Author's own)

3.3.1.2: Life Satisfaction

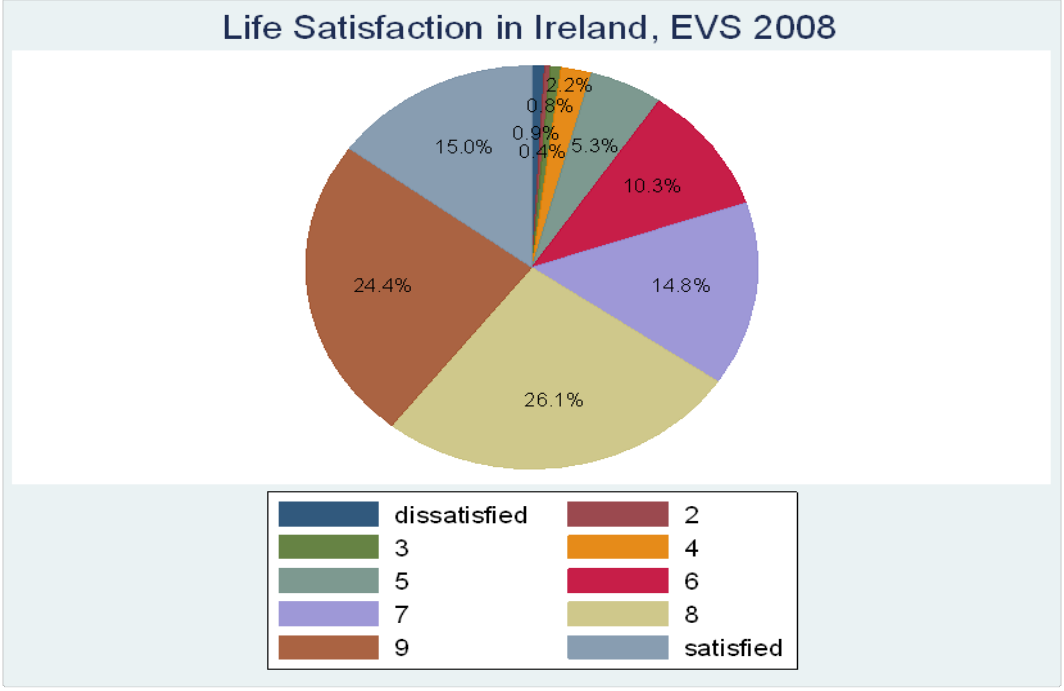
What follows is the absolute frequency and percentages of 2008 EVS life satisfaction data obtained from the question: *"How satisfied are you with your life?"* Interviewees ranked their answers on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). A total of 1,009 republic of Ireland residents specified their life satisfaction category. The distribution of self-reported life satisfaction levels in Ireland 2008 are illustrated in Table 3.3.1.2 and Figure 3.3.1.2. The sample mean for the dependent variable life satisfaction is 7.8 with a min of 1 and a max of 10.

Table 3.3.1.2: Self-Reported Levels of Life Satisfaction in Ireland, EVS 2008

How satisfied are you with your life?	Absolute frequency	Percentage
Dissatisfied	9	0.89%
2	4	0.40%
3	8	0.79%
4	22	2.18%
5	53	5.25%
6	104	10.31%
7	149	14.77%
8	263	26.07%
9	246	24.38%
Satisfied	151	14.97%

(Source: Author's own)

Figure 3.3.1.2: Self-Reported Levels of Life Satisfaction in Ireland, EVS 2008



(Source: Author's own. Life satisfaction levels ranging from 1 = dissatisfied to 10 = satisfied)

3.3.2: Household Income

The primary independent variable, when estimating the effect of absolute, reference and relative income on individual well-being levels in Ireland, is "annual household income[3.3.2]". This variable concerns itself with the self-reported answers to the Irish 2008 EVS question which follows: *"Here is a list of incomes and we would like to know in what group your household is, counting all wages, salaries, pensions and other incomes that come in. Just give the letter of the group your household falls into, after taxes and other deductions"*. Interviewees ranked their responses on a 12 point scale ranging from the following values:

- Less than €1,800
- €1,800 to under €3,600
- €3,600 to under €6,000
- €6,000 to under €12,000
- €12,000 to under €18,000
- €18,000 to under €24,000
- €24,000 to under €30,000
- €30,000 to under €36,000
- €36,000 to under €60,000
- €60,000 to under €90,000
- €90,000 to under €120,000
- €120,000 or more

A total of 582 individuals stated which annual household income category they belonged to. The sample mean for this independent variable is 6.9 with a min of 1 and a max of 12. The distribution of self-reported annual household income levels in Ireland 2008 is illustrated in Table 3.3.2 and Figure 3.3.2.

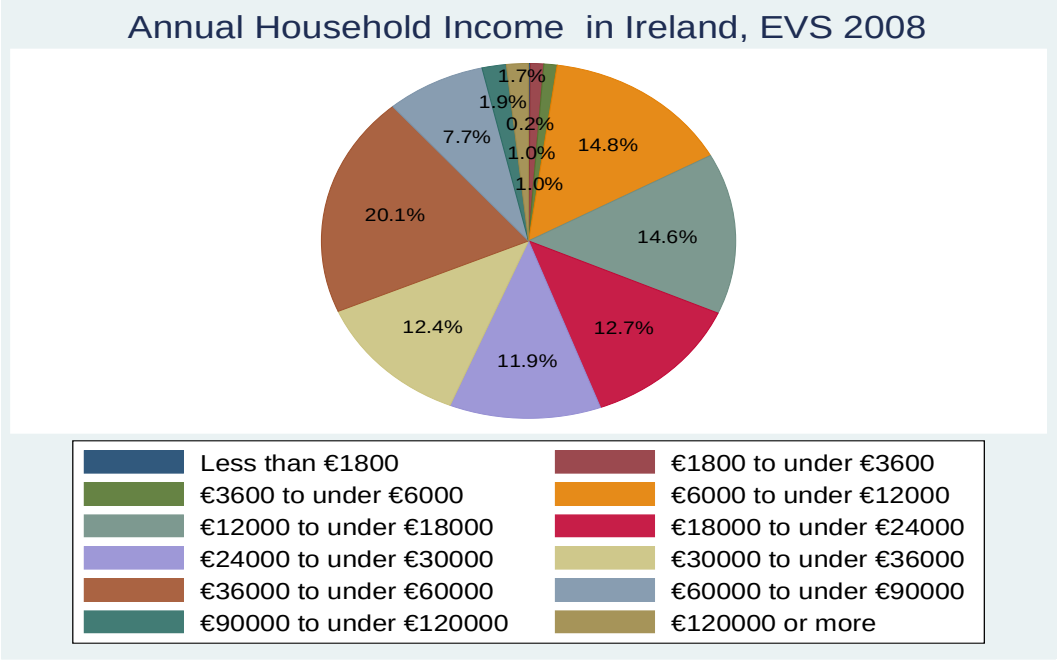
[3.3.2] Equivalising income accounts for the quantity of individuals living in each household. This thesis does not use equivalence annual household income due to the large quantity of missing data when concerning the quantity of individuals living in each household. Income may be equivalised by dividing the annual household income of each respondent by the square root of the number of individuals living in that respondent's household. This technique of equivalising income has been employed by economic studies including Sacks *et al.,* (2010), Graham *et al*., (2004) and Atkinson *et al.,* (1995). All household members are given an equal equivalent income irrespective of gender, age or relationship to the head of household (Atkinson *et al.,* 1995). Nevertheless, when determining the within nation well-being-income relationship Sacks *et al.,* (2010) find similar results when analysing income with or without per equivalent household.

Table 3.3.2: Self-Reported Levels of Annual Household Income in Ireland, EVS 2008

Annual household income	Absolute frequency	Percentage
Less than €1,800	1	0.17%
€1,800 to under €3,600	6	1.03%
€3,600 to under €6,000	6	1.03%
€6,000 to under €12,000	86	14.78%
€12,000 to under €18,000	85	14.60%
€18,000 to under €24,000	74	12.71%
€24,000 to under €30,000	69	11.86%
€30,000 to under €36,000	72	12.37%
€36,000 to under €60,000	117	20.10%
€60,000 to under €90,000	45	7.73%
€90,000 to under €120,000	11	1.89%
€120,000 or more	10	1.72%

(Source: Author's own)

Figure 3.3.2: Self-Reported Levels of Annual Household Income in Ireland, EVS 2008



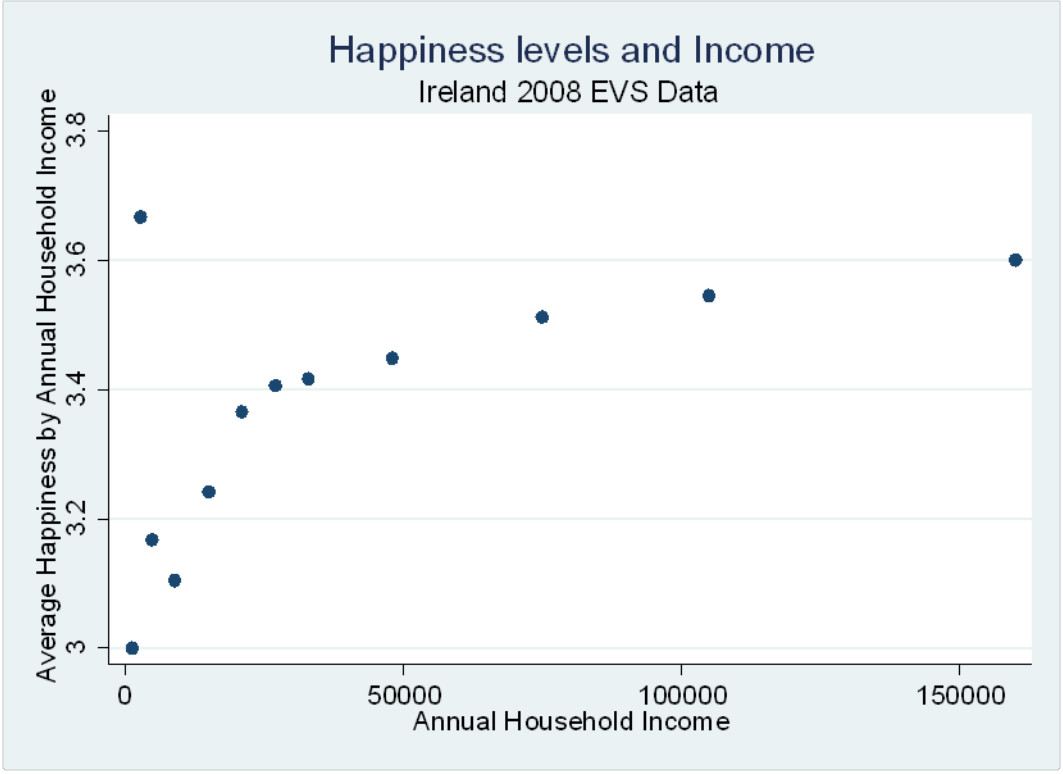
(Source: Author's own)

3.3.2.1: Happiness and Household Income

The following Figure (3.3.2.1) illustrates the average happiness levels by absolute annual household income of individuals interviewed for the Irish 2008 EVS. Intuitively there appears to be a positive relationship between happiness and income.[3.3.2.1]. As absolute annual income levels increase individuals, on average, report higher levels of happiness. However, the increase in happiness associated with absolute annual household income seems to get smaller as income increases. This finding highlights the theory of diminishing marginal utility of consumption or income. This theory states that as ones total consumption or income increases the extra utility/well-being one receives from each additional unit of consumption or income declines (Campbell, 2003). This theory assumes that once an individual's basic material needs are satisfied, non-material wealth such as health and religion primarily determine an individual's well-being. When assessing Figure 3.3.2.1 a note of caution is however recommended. When determining the functional form of the subjective-well-being-income relationship the curvilinear relationship is due to the well-being and absolute income (not the superior logarithm of income) relationship being considered. Not using the log of income when deriving Figure 3.3.2.1 stems from the desire to depict initial EVS data in this chapter.

[3.3.2.1]An outlier occurs at an income level of "€1,800 to under €3,600". Individuals in this income group appear to report the highest level of happiness in Ireland**.**

Figure 3.3.2.1: Happiness and Annual Household Income in Ireland, EVS 2008



(Source: Author's own)

What follows in table 3.3.2.1 is the quantity of respondents reporting each happiness level at the 12 various annual household income levels.

Table 3.3.2.1: Quantity of Respondents Reporting Each Happiness Level at the 12 Various Annual Household Income Levels in Ireland, EVS 2008

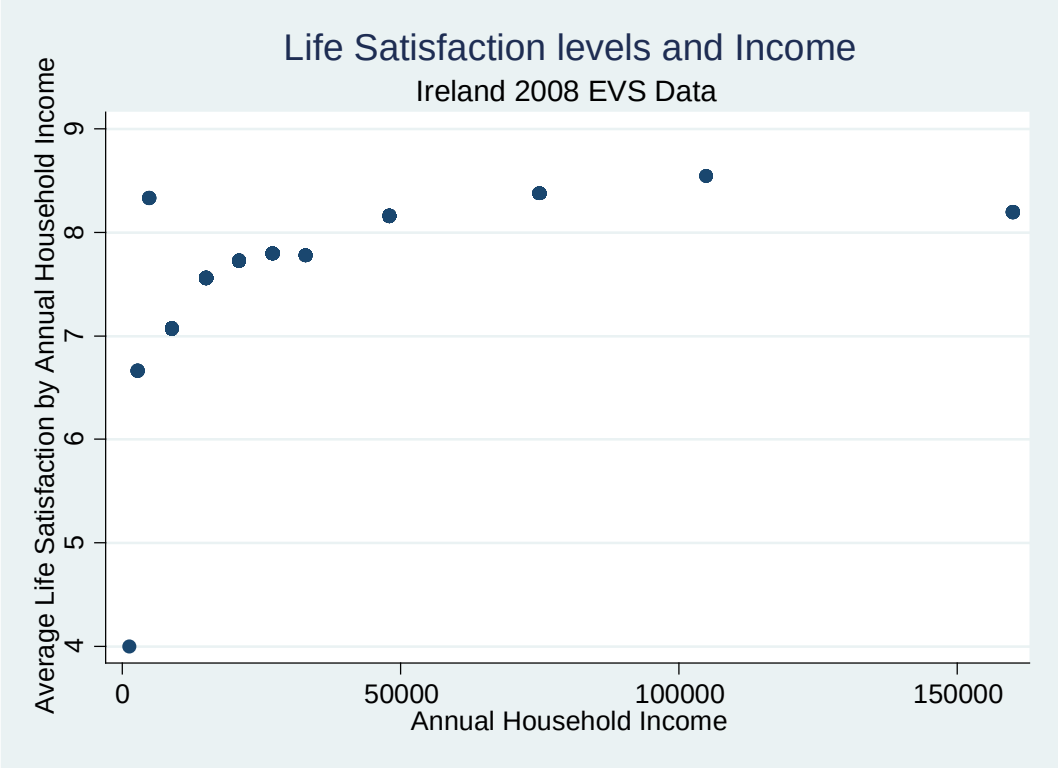
Taking all things together how happy are you?	Very happy	Quite happy	Not very happy	Not at all happy
Reported income of less than €1,800	0	1	0	0
Reported income of €1,800 to under €3,600	4	2	0	0
Reported income of €3,600 to under €6,000	1	5	0	0
Reported income of €6,000 to under €12,000	24	48	13	1
Reported income of €12,000 to under €18,000	28	47	8	0
Reported income of €18,000 to under €24,000	30	41	3	0
Reported income of €24,000 to under €30,000	32	35	0	2
Reported income of €30,000 to under €36,000	35	33	3	1
Reported income of €36,000 to under €60,000	57	55	3	1
Reported income of €60,000 to under €90,000	24	20	1	0
Reported income of €90,000 to under €120,000	5	6	0	0
Reported income of €120,000 or more	6	4	0	0

(Source: Author's own)

3.3.2.2: Life Satisfaction and Household Income

The following Figure (3.3.2.2) shows the average life satisfaction levels by absolute annual household income reported by participants of the Irish 2008 EVS. As with the happiness variable there appears to be a positive relationship between life satisfaction and income. As one raises absolute annual income levels, on average, individuals report greater levels of life satisfaction. Here an outlier occurs at an income level of "€3,600 to under €6,000".

Figure 3.3.2.2: Life Satisfaction and Annual Household Income in Ireland, EVS 2008



*(Source: Author's own***)**

What follows in table 3.3.2.2 is the number of respondents declaring each life satisfaction level at the 12 different annual household income categories.

Table 3.3.2.2: Quantity of Respondents Reporting Each Life Satisfaction Level at the 12 Various Annual Household Income Levels in Ireland, EVS 2008

How satisfied are you with your life?	Income of less than €1800	Income of €1800 to under €3600	Income of €3600 to under €6000	Income of €6000 to under €12000	Income of €12000 to under €18000	Income of €18000 to under €24000	Income of €24000 to under €30000	Income of €30000 to under €36000	Income of €36000 to under €60000	Income of €60000 to under €90000	Income of €90000 to under €120000	Income of €120000 or more
Dissatisfied	0	0	0	2	0	0	2	1	1	0	0	0
2	0	0	0	0	1	0	0	1	0	0	0	0
3	0	0	0	2	0	0	0	1	1	0	0	0
4	1	0	0	3	3	3	0	1	0	2	0	0
5	0	2	0	8	5	8	1	4	5	1	0	0
6	0	1	0	16	12	4	9	9	4	1	0	1
7	0	0	2	17	15	13	12	5	16	3	2	2
8	0	3	1	15	23	22	19	19	39	15	2	2
9	0	0	2	14	15	11	19	21	32	13	6	4
Satisfied	0	0	1	8	10	13	7	10	19	10	1	1

(Source: Author's own)

3.3.3: Other Independent Variables and Descriptive Statistics

Neoclassical economists traditionally derive utility purely from income as arbitrated by consumer preferences and choice (Graham, 2005). However, economists have become increasingly apprehensive with regards to the traditional preference theory when measuring utility/well-being. This results from the frequent discrepancies which occur between individual reported well-being and income levels. Therefore, differences in income levels explain only a small fraction of the disparity in well-being levels among individuals. Easterlin (2001) finds a 0.20 correlation between well-being and income in the United States. This low correlation coefficient specifies the importance of other economic and non-economic variables which affect individual well-being levels. When estimating the effect of absolute, reference and relative income on individual well-being levels in Ireland, several variables which have been shown to determine well-being in previous economic literature are accounted for. Discounting the income variables, the included correlates and precipitators of individual well-being are health, religion, employment, gender, job satisfaction, age and region. What follows in Table 3.3.3 is the descriptive statistics of all the variables included when estimating the effect of absolute, reference and relative income on individual well-being levels in Ireland.

Table 3.3.3: Description of Variables and Summary Statistics, Chapter 4

Variable	Variable Description	Mean	Standard Error	Min	Max
Happy (dependent variable)	Respondents were asked "taking all things together how happy are you?" with the option of choosing: 4: very happy, 3: quite happy, 2: not very happy, 1: not at all happy.	3.410	0.609	1	4
Satisfiedlife (dependent variable)	Respondents were asked "how satisfied are you with your life?" ranking their responses from 1(dissatisfied) to 10 (satisfied).	7.819	1.724	1	10
Referenceincome	Respondent's household reference annual income. The reference income is defined as the average income of all individuals in the same reference group.	33987.46	17949.49	4800	132500
Relativeincome	Respondent's household relative annual income. Absolute income - reference income = relative income.	460.954	26509.52	-72425	134150
Absoluteincome	Respondent's household absolute annual income.	33735.74	27052.93	1200	160000
Relvimp	Respondents who state that religion is very important in their live = 1, 0 = otherwise.	0.303	0.460	0	1
Relqimp (base)	Respondents who state that religion is quite important in their live = 1, 0 = otherwise.	0.361	0.481	0	1
Relnimp	Respondents who state that religion is not important in their live = 1, 0 = otherwise.	0.209	0.407	0	1
Relnalimp	Respondents who state that religion is not at all important in their live = 1, 0 = otherwise.	0.114	0.317	0	1
Healthvgood (base)	Respondents who describe their state of health as very good = 1, 0 = otherwise.	0.490	0.500	0	1
Healthgood	Respondents who describe their state of health as good = 1, 0 = otherwise.	0.346	0.476	0	1
Healthfair	Respondents who describe their state of health as fair = 1, 0 = otherwise.	0.120	0.326	0	1
Healthpoor	Respondents who describe their state of health as poor = 1, 0 = otherwise.	0.026	0.158	0	1

(Source: Author's own)

Table 3.3.3 continued: Description of Variables and Summary Statistics, Chapter 4

Variable	Variable Description	Mean	Standard Error	Min	Max
Healthvpoor	Respondents who describe their state of health as very poor = 1, 0 = otherwise.	0.005	0.070	0	1
Jobdissatisfied	Respondents satisfaction with job at a scale of 1 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) =1, 0 = otherwise.	0.001	0.031	0	1
Jobsatisfied2	Respondents satisfaction with job at a scale of 2 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.002	0.044	0	1
Jobsatisfied4	Respondents satisfaction with job at a scale of 4 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.011	0.104	0	1
Jobsatisfied5	Respondents satisfaction with job at a scale of 5 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.019	0.136	0	1
Jobsatisfied6	Respondents satisfaction with job at a scale of 6 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.030	0.170	0	1
Jobsatisfied7	Respondents satisfaction with job at a scale of 7 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.086	0.280	0	1
Jobsatisfied8	Respondents satisfaction with job at a scale of 8 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.123	0.329	0	1
Jobsatisfied9	Respondents satisfaction with job at a scale of 9 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.099	0.298	0	1
Jobsatisfied (base)	Respondents satisfaction with job at a scale of 10 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.125	0.331	0	1
Male	Respondent is male = 1, 0 = otherwise.	0.403	0.491	0	1
Female (base)	Respondent is female = 1, 0 = otherwise.	0.597	0.491	0	1
EmpM30 (base)	Respondent has paid employment of 30 hours a week or more = 1, 0 = otherwise.	0.391	0.488	0	1

(Source: Author's own. jobsatisfied3 omitted due to no individual in the Irish 2008 EVS reporting a job satisfaction level of 3)

Table 3.3.3 continued: Description of Variables and Summary Statistics, Chapter 4

Variable	Variable Description	Mean	Standard Error	Min	Max
EmpL30	Respondent has paid employment of less than 30 hours a week = 1, 0 = otherwise.	0.098	0.297	0	1
EmpSelf	Respondent has paid self-employment = 1, 0 = otherwise.	0.053	0.225	0	1
EmpRetired	Respondent has no paid employment and is retired/pensioned = 1, 0 = otherwise.	0.112	0.315	0	1
EmpHousewife	Respondent has no paid employment and is a housewife not otherwise employed = 1, 0 = otherwise.	0.198	0.399	0	1
EmpStudent	Respondent has no paid employment and is a student = 1, 0 = otherwise.	0.037	0.188	0	1
EmpUnemployed	Respondent has no paid employment and is unemployed = 1, 0 = otherwise.	0.069	0.254	0	1
EmpDisability	Respondent has no paid employment resulting from disability = 1, 0 = otherwise.	0.013	0.113	0	1
EmpOther	Respondent has no paid employment due to other factors = 1, 0 = otherwise.	0.005	0.070	0	1
Age17to25	Respondents who, in 2008, were aged between 17 and 25 = 1, 0 = otherwise.	0.129	0.336	0	1
Age26to35 (base)	Respondents who, in 2008, were aged between 26 and 35 = 1, 0 = otherwise.	0.199	0.400	0	1
Age36to45	Respondents who, in 2008, were aged between 36 and 45 = 1, 0 = otherwise.	0.188	0.391	0	1
Age46to55	Respondents who, in 2008, were aged between 46 and 55 = 1, 0 = otherwise.	0.163	0.369	0	1
Age56to65	Respondents who, in 2008, were aged between 56 and 65 = 1, 0 = otherwise.	0.129	0.336	0	1
Age66to75	Respondents who, in 2008, were aged between 66 and 75 = 1, 0 = otherwise.	0.098	0.297	0	1
Age76plus	Respondents who, in 2008, were aged 76 and over = 1, 0 = otherwise.	0.063	0.243	0	1

(Source: Author's own)

Table 3.3.3 continued: Description of Variables and Summary Statistics, Chapter 4

Variable	Variable Description	Mean	Standard Error	Min	Max
Border	Respondents who live in Ireland - Border, Midland and Western - Border = 1, 0 = otherwise.	0.105	0.307	0	1
Midland	Respondents who live in Ireland - Border, Midland and Western - Midland = 1, 0 = otherwise.	0.064	0.244	0	1
West	Respondents who live in Ireland - Border, Midland and Western - West = 1, 0 = otherwise.	0.094	0.292	0	1
Dublin (base)	Respondents who live in Ireland - Southern and Eastern - Dublin = 1, 0 = otherwise.	0.268	0.443	0	1
MidEast	Respondents who live in Ireland - Southern and Eastern - Mid-East = 1, 0 = otherwise.	0.107	0.309	0	1
MidWest	Respondents who live in Ireland - Southern and Eastern - Mid-West = 1, 0 = otherwise.	0.106	0.308	0	1
SouthEast	Respondents who live in Ireland - Southern and Eastern - South-East = 1, 0 = otherwise.	0.112	0.315	0	1
SouthWest	Respondents who live in Ireland - Southern and Eastern - South-West = 1, 0 = otherwise.	0.120	0.325	0	1

(Source: Author's own)

3.4: Variables used when Examining the Existence of a Particular Income Level Beyond Which a Change in the Well-Being-Income Relationship Occurs in Europe

When testing the existence of a particular income level beyond which a change in the well-being-income relationship occurs, 2008 integrated European data from the EVS where 67,786 valid interviews were conducted, is employed.

The 2008 EVS incorporates all European nations. In total surveys were administered in 47 nations and regions. EVS 2008 focuses on a vast range of values. Questions in relation to family, work, religion, politics and societal values are comparable to those in the first, second and third EVS waves (EVS, 2011).

For the EVS 2008 data, representative multi-stage or stratified random samples of the adult population of individuals 18 years and older were drawn (EVS, 2011). Exceptions are Armenia where individuals aged 15 years and older and Finland where individuals aged 18 to 74 years were drawn. Between 2008 and 2010 face-to-face interviews were conducted with standardised questionnaires. The two exceptions are Finland, where internet panels and Sweden, where postal surveys were used. Respondents were required to have obtained sufficient command of one of the respective national languages. Approximately 250 questions are included in the questionnaire and on average, respondents required 70 minutes for completion (EVS, 2011). The net sample size of completed interviews is 1,500 per country. Exceptions include Northern Cyprus and Northern Ireland (500 interviews each), Iceland (808 interviews), Cyprus (1,000 interviews), Ireland (1,013 interviews), Norway (1,090 interviews), Finland (1,134 interviews), Sweden (1,187 interviews), Switzerland (1,272 interviews), France (random sample of 1,501 and two additional quota samples of 1,570 interviews) and Germany (East: 1,004 interviews, West: 1,071 interviews).

Concerning the questionnaire, a Theory Group critically reviewed the existing questions, proposed new questions and insured that all questions were standardised between waves and nations. The Council of National Program Directors then critically reviewed and finally approved the questionnaire. Additionally, the translation process, fieldwork procedures and data processing were all standardised according to stringent guidelines set out by a Methodology Group (EVS, 2011). The EVS advisory groups

administered detailed and uniform instructions for the conduction of fieldwork in all included nations. The English basic questionnaire was translated by “WebTrans”, a web-based translation system designed by Gallup Europe. To guarantee high scientific standards, interviewers were extensively trained and a minimum of three revisits, where the selected respondent was unavailable, was insured. Upon each visit, a predefined contact form was completed and quality control back-checks were enforced (EVS, 2011). A comprehensive description of the integrated EVS 2008 is illustrated in Table A3.4 in the Appendix.

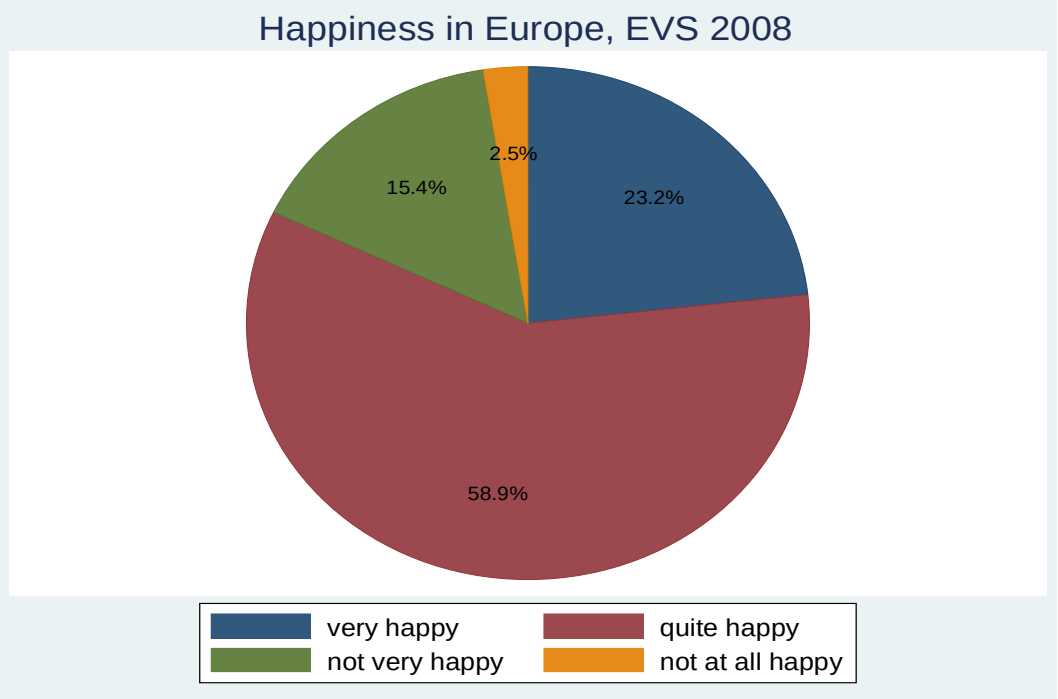
3.4.1: Happiness and Life Satisfaction

The empirical analysis, when examining the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe, is based on the survey results of the integrated 2008 wave of the EVS. The dependent variable is based on the subjective, self-reported measure of well-being namely, happiness and life satisfaction.

3.4.1.1: Happiness

Happiness is measured, in the integrated 2008 EVS, by the response to the following question: *"All things together how happy are you?"* Respondents ranked their answers on an ordered scale, with the choice of selecting "very happy", "quite happy", "not very happy" or "not at all happy". A total of 66,856 individuals in the EVS 2008 wave determined their happiness levels. The distribution of self-reported happiness levels in Europe 2008 is displayed in Figure 3.4.1.1 and Table 3.4.1.1. 23.23% or a total of 15,528 interviewees reported a happiness level of 4 (very happy). 58.87% or a total of 39,355 candidates stated a happiness level of 3 (quite happy), 15.38% or a total of 10,281 individuals claimed a happiness level of 2 (not very happy) and 2.53% or a total of 1,692 people cited a happiness level of 1 (not at all happy). The sample mean for the dependent variable happiness is 3.03 with a min of 1 and a max of 4.

Figure 3.4.1.1: Self-Reported Levels of Happiness in Europe, EVS 2008



(Source: Author's own)

Table 3.4.1.1: Self-Reported Levels of Happiness in Europe, EVS 2008

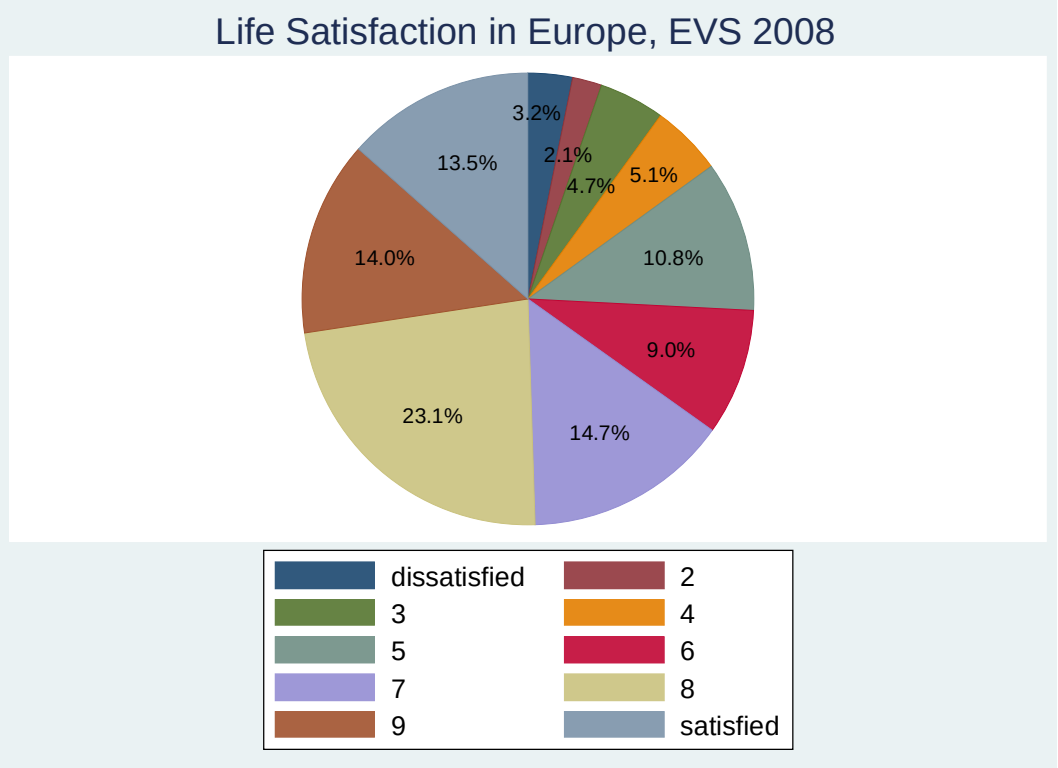
Taking all things together how happy are you?	Absolute frequency	Percentage
Very happy	15,528	23.23%
Quite happy	39,355	58.87%
Not very happy	10,281	15.38%
Not at all happy	1,692	2.53%

(Source: Author's own)

3.4.1.2: Life Satisfaction

What follows is the integrated EVS 2008 data from the life satisfaction question: *"How satisfied are you with your life?"* Respondents ranked their replies on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). A total of 67,216 individuals, in the EVS 2008 wave, determined their life satisfaction level. The distribution of self-reported life satisfaction levels in Europe 2008 is illustrated in Figure 3.4.1.2 and Table 3.4.1.2. The dependent variable life satisfaction has a sample mean of 6.97 with a min of 1 and a max of 10.

Figure 3.4.1.2: Self-Reported Levels of Life Satisfaction in Europe, EVS 2008



(Source: Author's own. Life satisfaction levels ranging from 1 = dissatisfied to 10 = satisfied)

Table 3.4.1.2: Self-Reported Levels of Life Satisfaction in Europe, EVS 2008

How satisfied are you with your life?	Absolute frequency	Percentage
Satisfied - Respondents reporting a life satisfaction level of 10 (ranging from 1 = dissatisfied to 10 = satisfied).	9,046	13.46%
9 - Respondents reporting a life satisfaction level of 9 (ranging from 1 = dissatisfied to 10 = satisfied).	9,377	13.95%
8 - Respondents reporting a life satisfaction level of 8 (ranging from 1 = dissatisfied to 10 = satisfied).	15,512	23.08%
7 - Respondents reporting a life satisfaction level of 7 (ranging from 1 = dissatisfied to 10 = satisfied).	9,866	14.68%
6 - Respondents reporting a life satisfaction level of 6 (ranging from 1 = dissatisfied to 10 = satisfied).	6,053	9.01%
5 - Respondents reporting a life satisfaction level of 5 (ranging from 1 = dissatisfied to 10 = satisfied).	7,253	10.79%
4 - Respondents reporting a life satisfaction level of 4 (ranging from 1 = dissatisfied to 10 = satisfied).	3,412	5.08%
3 - Respondents reporting a life satisfaction level of 3 (ranging from 1 = dissatisfied to 10 = satisfied).	3,132	4.66%
2 - Respondents reporting a life satisfaction level of 2 (ranging from 1 = dissatisfied to 10 = satisfied).	1,433	2.13%
Dissatisfied - Respondents reporting a life satisfaction level of 1 (ranging from 1 = dissatisfied to 10 = satisfied).	2,132	3.17%

(Source: Author's own)

3.4.2: Well-Being and Household Income

Annual household income at PPP is a primary explanatory variable when examining the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe. The use of PPP's is considered an essential inclusion as it removes differences arising from arbitrary exchange rates (O'Connell, 2004). The used income variable is derived from the raw data of the 2008 EVS "monthly household income" in Euros (x1000) for PPP. For this monthly household income variable the EVS exchanged national currency for each nation into Euros and modified for PPP. The year in which the EVS data was gathered in each nation formed the basis when calculating the PPP and exchange rates.

The EVS derives PPP from the October 2008 Edition of the IMF World Economic Outlook Database (October 2008 Edition). Exceptions include Montenegro where the World Bank statistics 2009 were employed and Kosovo where the CIA World Factbook 2009 was used. The exchange rate was derived over the survey period for non-euro nations. Exchange rates were derived from the European Central Bank for Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Hungary, Iceland, Latvia, Lithuania, Republic of Macedonia, Republic of Moldova, Norway, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Sweden, Switzerland, Turkey, Ukraine and the United Kingdom. For the remaining nations exchange rates were derived from OANDA which is a foreign trading and exchange rates service.

When constructing the linear income variable, the mid-points of each nation's specific income categories are used. For the first income category, the mid-point is made equal to the upper bound minus half the range of the second category. For example if the income category 1<500 Euro and income category 2 = 500-800 Euro, then the mid-point of the first income category is: 500-(800-500)/2 = 350 Euro. When deriving the mid-point of the last income category, an equal range for the last and the penultimate category is assumed. For example if the second last income category = 7,500 – 10,000 Euro and the last income category >10,000 Euro, then the mid-point of the last income category is: 10.000+(2,500/2) = 11,250 Euro.

The 2008 EVS records a monthly household income variable, from a total of 55,635 individuals. Each of these 55,635 individuals fall into one of 610 various monthly household income levels. The sample mean for the independent variable monthly household income in Euros (x1000) for PPP is 1.212357 with a min of .0102109 and a max of 14.72816.

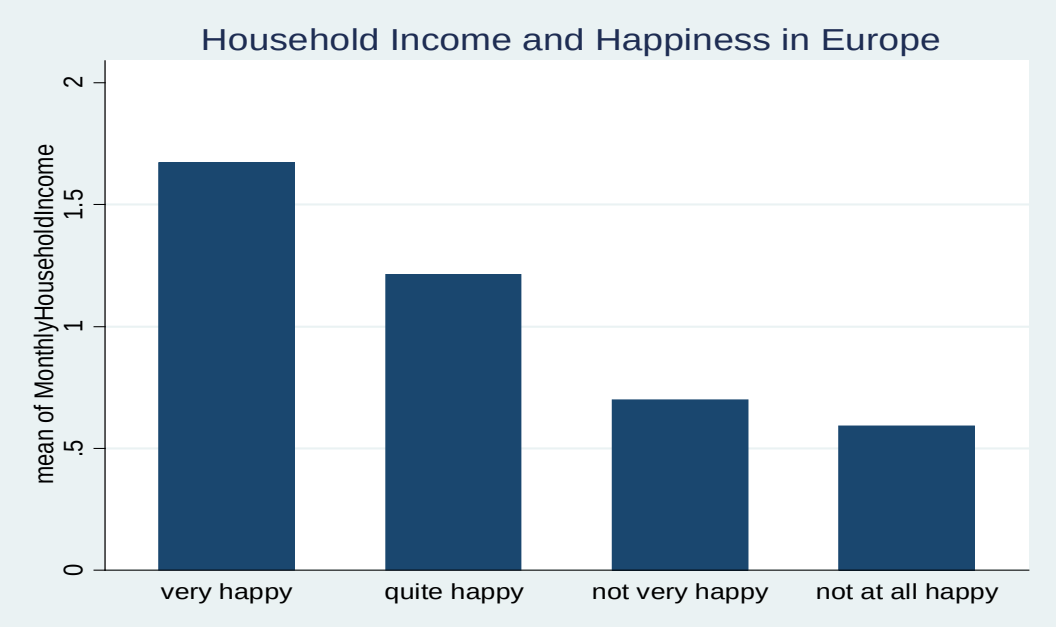
As stated the 2008 wave of the EVS records monthly household income (x1000) measured at PPP (in Euros). In order to acquire an annual household income measure for each individual a new income variable was created. An individual's annual household income in PPP was derived by multiplying the recorded monthly household income by 1000 and then by 12. In order to estimate both the macroeconomic and microeconomic analyses in the same currency this thesis converts data on household income into US dollars. 2008 European Central Bank data on the reference exchange rates of US dollar/euro is used. This new variable records annual household income measured at PPP (international $). This chapter desires to depict initial EVS data and thus the 2008 EVS monthly household income (x1000) measured at PPP (in Euros) is concentrated on in the following subsections.

3.4.2.1: Happiness and Household Income

Figure 3.4.2.1a illustrates the average monthly household income by happiness of respondents of the 2008 EVS. This figure may be used to broadly determine if any relationship between happiness and household income exists. A clear positive relationship between happiness and monthly household income is depicted. There is a distinct and consistent reduction in average household income as one reduces happiness levels. Thus, on average individuals who report a happiness level of "very happy" possess the highest monthly household income levels. This is followed by individuals who report a happiness level of "quite happy", "not very happy" and finally individuals who report a happiness level of "not at all happy" have, on average, the lowest monthly household income levels.

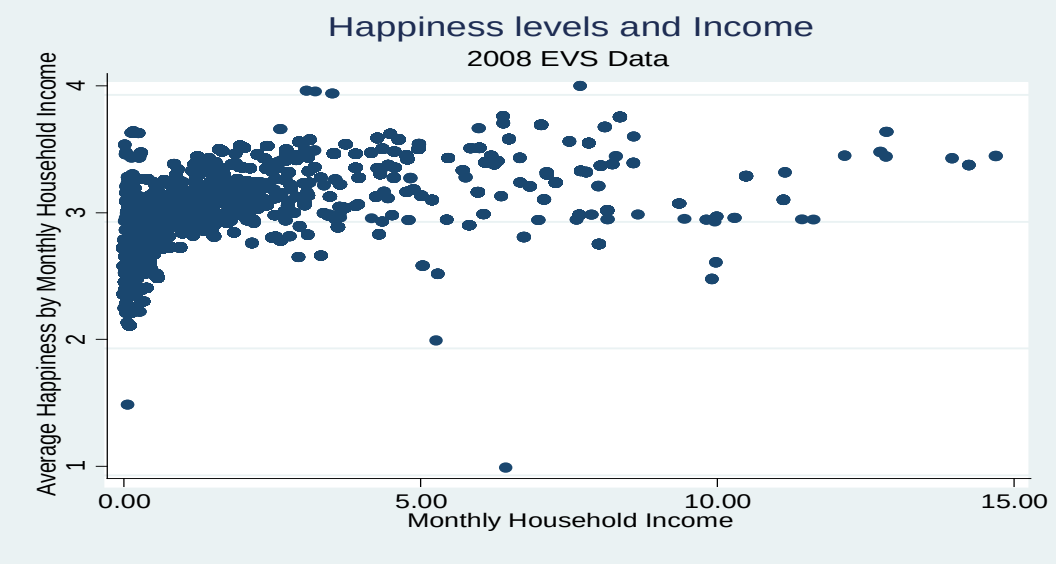
Figure 3.4.2.1b presents the average happiness levels by monthly household income of respondents of the 2008 EVS. This figure confirms the positive relationship between happiness and household income. However, as respondent's total household income increases the extra happiness received from each additional unit of income declines. This finding is consistent with the theory of diminishing marginal utility of consumption or income. When determining the functional form of the subjective-well-being-income relationship in Figure 3.4.2.1b the curvilinear relationship is due to the well-being-absolute-income (not the superior logarithm of income) relationship being considered.

Figure 3.4.2.1a: Average Monthly Household Income of Individuals in Each of the Happiness Levels in Europe, EVS 2008



(Source: Author's own)

Figure 3.4.2.1b: Happiness and Average Monthly Household Income in Europe, EVS 2008

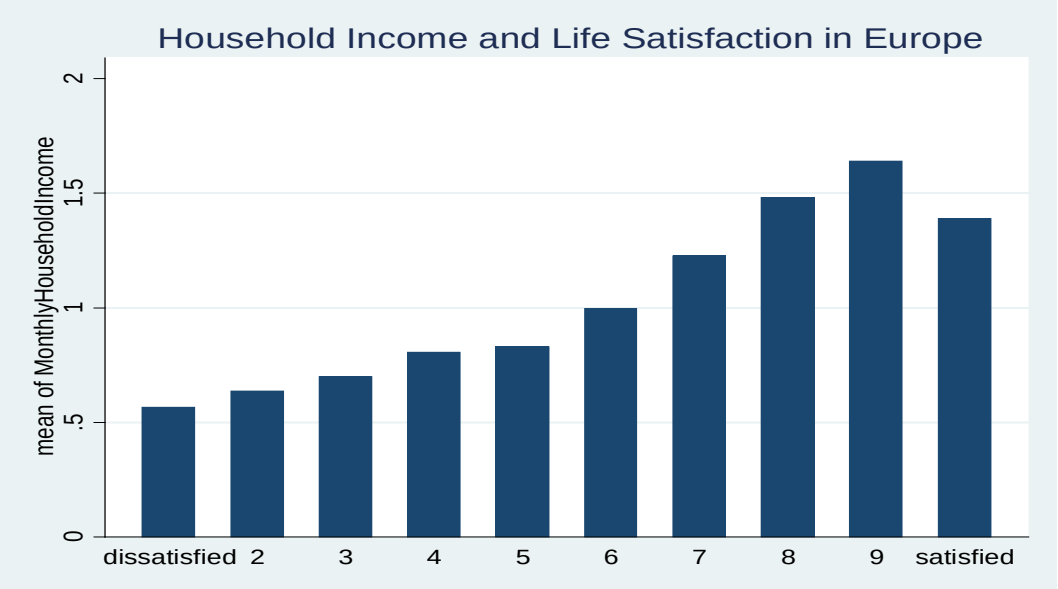


(Source: Author's own)

3.4.2.2: Life Satisfaction and Household Income

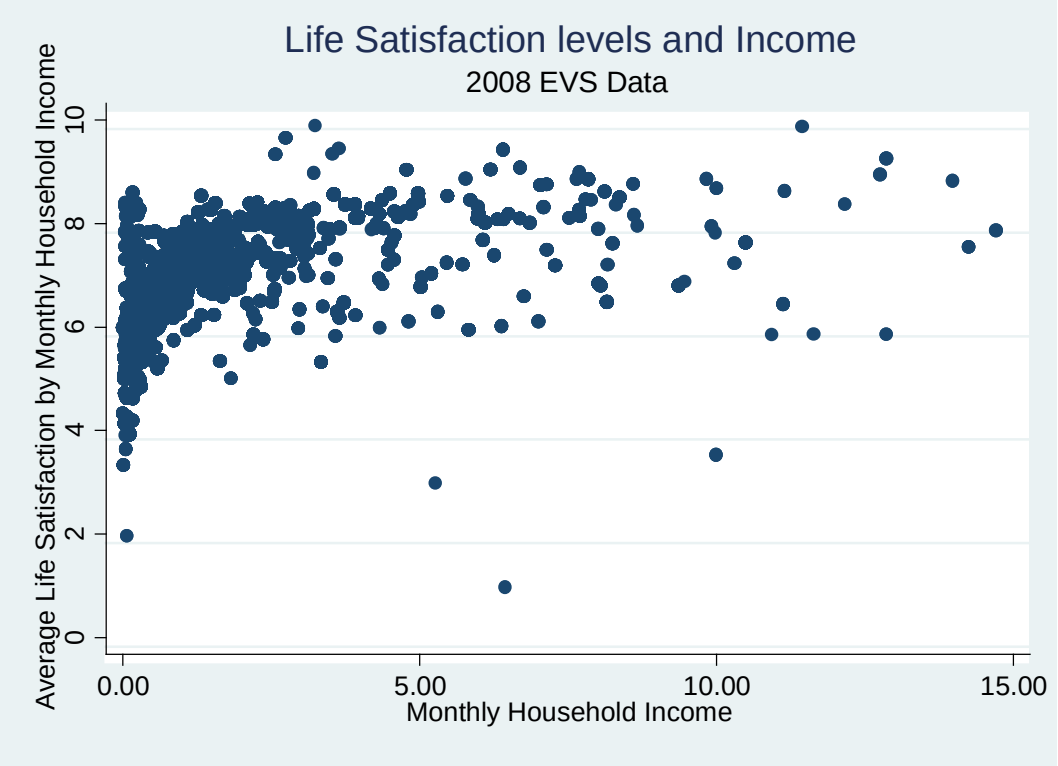
Figure 3.4.2.2a illustrates the average monthly household income by life satisfaction of participants in the 2008 EVS. This figure can be employed when roughly determining if any correlation between life satisfaction and household income exists. A distinct positive relationship between life satisfaction and household income is portrayed. A clear increase in average household income exists as one raises life satisfaction levels. An exception includes the life satisfaction level of 10, where respondents in this category report a lower average monthly household income level than those who report a life satisfaction level of 9 or 8. Figure 3.4.2.2b presents the average life satisfaction levels by monthly household income of respondents in the 2008 EVS. This figure also displays the positive relationship between life satisfaction and household income. However, as interviewee's total income rises the extra life satisfaction obtained from each extra unit of income declines. Please note here that the well-being and absolute income (not the superior logarithm of income) relationship is considered in Figure 3.4.2.2b. The use of absolute income and not the log of income results from the desire to depict initial EVS data in this chapter.

Figure 3.4.2.2a: Average Monthly Household Income of Individuals in Each of the Life Satisfaction Levels in Europe, EVS 2008



(Source: Author's own. Life satisfaction levels ranging from 1 = dissatisfied to 10 = satisfied)

Figure 3.4.2.2b: Life Satisfaction and Average Monthly Household Income in Europe, EVS 2008



(Source: Author's own)

3.4.3: Well-Being and National Income

The macroeconomic analysis of this thesis, concerns itself with GDP per capita based on PPP obtained from the World Bank's, International Comparison Program database. The World Bank's open data website provides free data on various comprehensive indicators concerning the development of nations around the globe. Table 3.4.3 presents the World Bank's GDP per capita data measured at PPP in current international dollars, for nations included in the 2008 EVS wave. This national income data is in current international $ based on the 2011 International Comparison Program round.

The World Bank uses PPP rates when converting GDP per capita measured at PPP into international dollars. One international dollar has an equal purchasing power over GDP as one U.S dollar has in the USA. GDP at purchaser's prices is equal to the total of gross value added by every resident producers in the economy added to product taxes minus subsidies not included in the value of the product. This calculation does not make deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

Table 3.4.3: Gross Domestic Product PPP in Current International $, Europe 2008

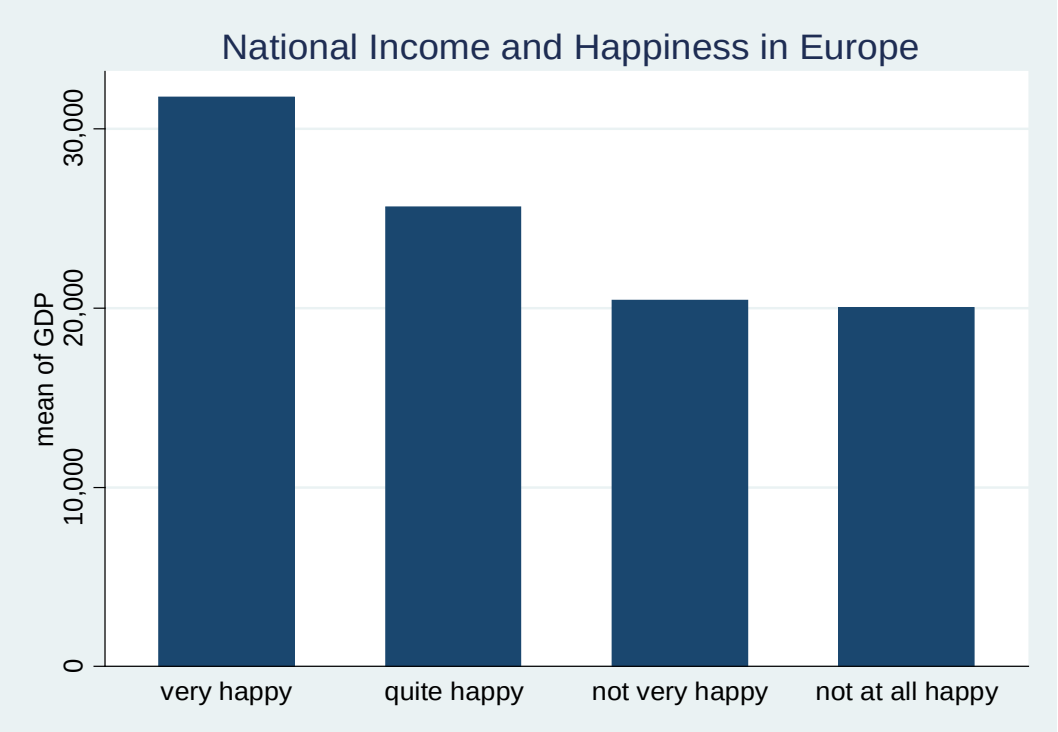
Country	2008 GDP per capita PPP (in current international $)
Albania	8,769.1
Armenia	7,089.8
Austria	41,151.6
Azerbaijan	13,795.3
Belarus	13,913.3
Belgium	37,953.8
Bosnia-Herzegovina	8,569.0
Bulgaria	14,565.9
Croatia	20,464.4
Cyprus	31,815.6
Czech Republic	27,111.5
Denmark	40,838.2
Estonia	22,500.4
Finland	39,729.6
France	35,144.0
Georgia	5,665.6
Germany	38,382.9
Great-Britain	37,753.0
Greece	30,872.5
Hungary	20,742.4
Iceland	41,528.5
Ireland	43,743.6
Italy	35,187.8
Kosovo	7,300.3
Latvia	18,827.9
Lithuania	20,617.5
Luxembourg	84,733.6
Macedonia Republic	10,487.0
Malta	25,462.1
Moldova	3,722.2
Montenegro	13,882.1
The Netherlands	45,897.1
Northern Cyprus	md.
Northern Ireland	md.
Norway	61,342.1
Poland	18,046.2
Portugal	26,095.8
Romania	15,694.3
Russian Federation	20,275.2
Serbia	11,892.8
Slovak Republic	23,786.7
Slovenia	29,598.1
Spain	33,729.5
Sweden	41,880.8
Switzerland	50,438.8
Turkey	15,177.5
Ukraine	8,427.8

(Source: Author's own. md. = missing data)

3.4.3.1: Happiness and National Income

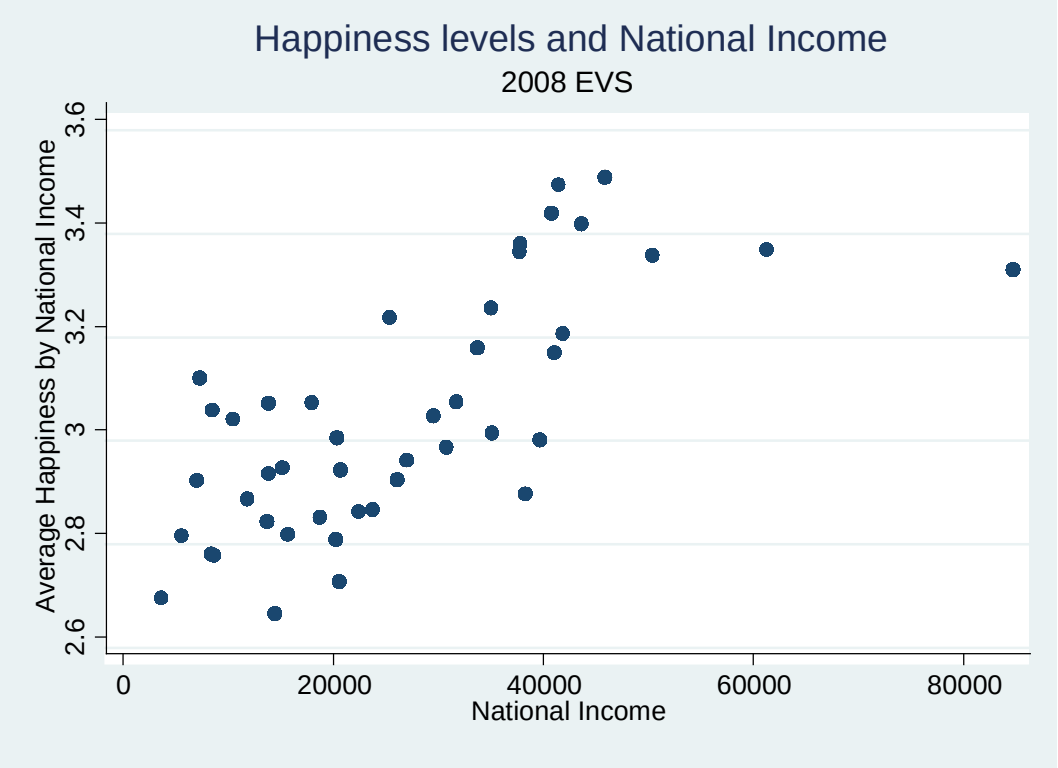
Figure 3.4.3.1a illustrates the average national income by happiness of respondents in the 2008 EVS. This figure broadly indicates if any relationship between happiness and national income exists. A clear positive relationship between happiness and national income is shown. There is a distinct and consistent reduction in average national income as one reduces happiness levels. Thus, on average individuals who report a happiness level of "very happy" are residents of the highest GDP nations in Europe. This is followed by individuals who report a happiness level of "quite happy", "not very happy" and finally individuals who report a happiness level of "not at all happy" live, on average, in the lowest GDP per capita nations in Europe. Figure 3.4.3.1b presents the average happiness levels by national income of respondents in the 2008 EVS. Intuitively this figure also appears to depict a positive relationship between happiness and national income.

Figure 3.4.3.1a: Average National Income of Individuals in Each of the Happiness Levels in Europe, EVS 2008



(Source: Author's own)

Figure 3.4.3.1b: Happiness and Average National Income in Europe, EVS 2008

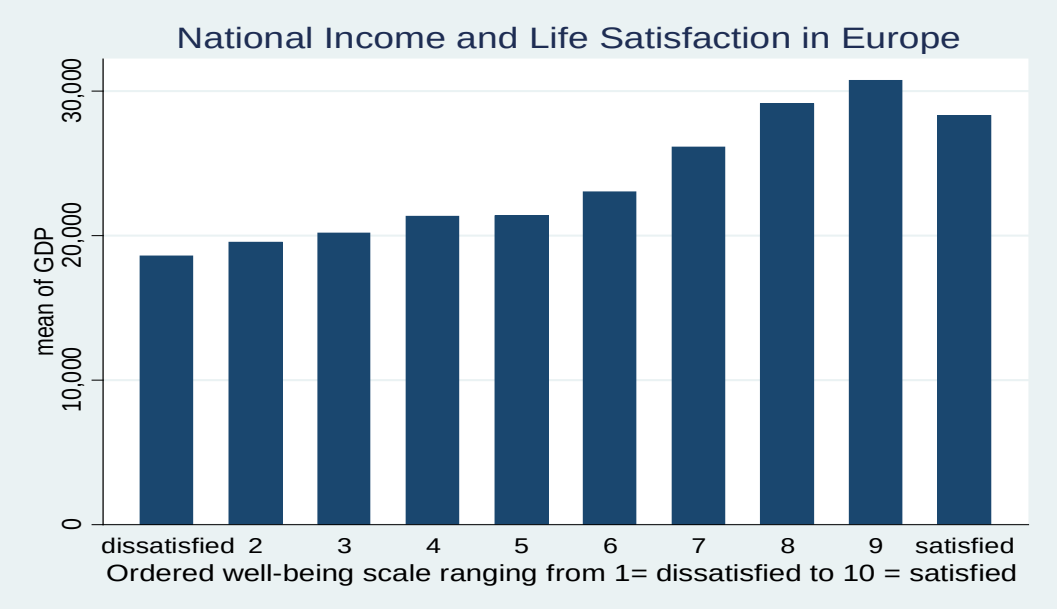


(Source: Author's own)

3.4.3.2: Life Satisfaction and National Income

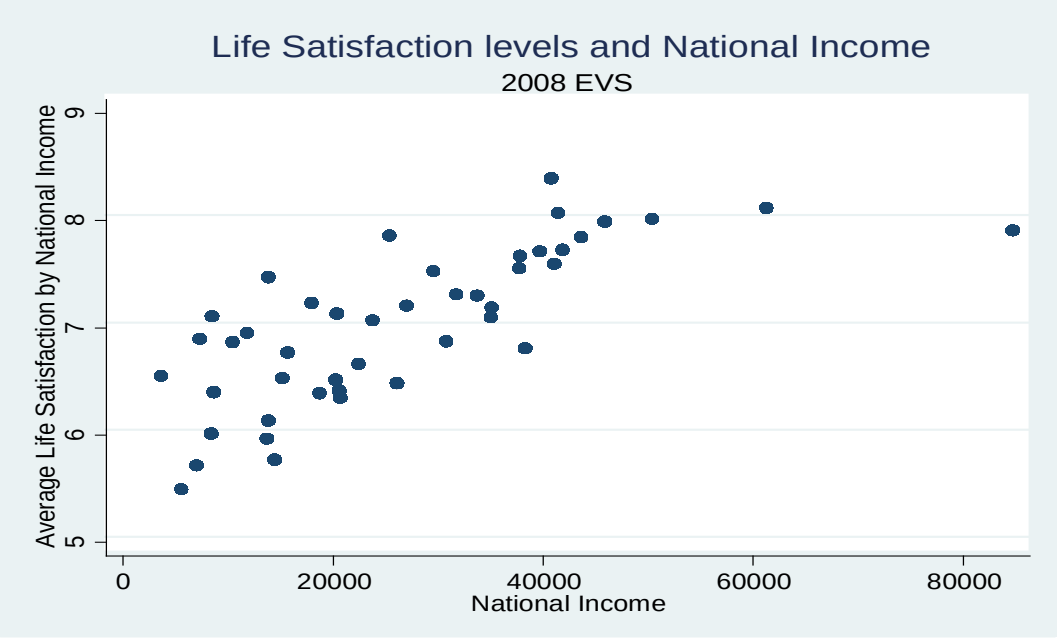
Figure 3.4.3.2a displays the average national income by life satisfaction of interviewees in the 2008 EVS. This figure generally displays if any relationship between life satisfaction and national income exists. A positive relationship between life satisfaction and national income is depicted. A reduction in average national income, as one reduces life satisfaction levels, can be seen. One exception is illustrated: individuals who report a life satisfaction level of 10 are residents in nations with a lower average national income level than those who report a life satisfaction level of 8 and 9. Figure 3.4.3.2b presents average life satisfaction levels by national income of respondents of the 2008 EVS. There appears to roughly be a positive relationship between life satisfaction and national income.

Figure 3.4.3.2a: Average National Income of Individuals in Each of the Life Satisfaction Levels in Europe, EVS 2008



(Source: Author's own)

Figure 3.4.3.2b: Life Satisfaction and Average National Income in Europe, EVS 2008



(Source: Author's own)

3.4.4: Other Independent Variables and Descriptive Statistics

When examining the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe standard demographic and individual variables are controlled for. These controls include national or individual income, religion, health, job satisfaction, marital status, gender, employment and age. What follows in Table 3.4.4 is the descriptive statistics of variables included when examining the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe**.**

Table 3.4.4: Description of Variables and Summary Statistics, Chapter 5

Variable	Variable Description	Mean	Standard Error	Min	Max
Happy (dependent variable)	Respondents were asked "Taking all things together how happy are you?" with the option of choosing: 1: not at all happy, 2: not very happy, 3: quite happy, 4: very happy.	3.028	0.698	1	4
Satisfiedlife (dependent variable)	Respondents were asked "How satisfied are you with your life?" ranking their responses from 1(dissatisfied) to 10 (satisfied).	6.972	2.323	1	10
GDP	National GDP in PPP obtained from the World Bank's database.	26016.39	16134.78	3722.2	84733.6
Absoluteincome	Respondent's annual household income in Dollars for PPP.	21397.61	22461.42	180.2189	259946.1
Age15to25	Respondents who, in 2008, were aged between 15 and 25 = 1, 0 = otherwise.	0.146	0.354	0	1
Age26to35	Respondents who, in 2008, were aged between 26 and 35 = 1, 0 = otherwise.	0.172	0.378	0	1
Age36to45 (base)	Respondents who, in 2008, were aged between 36 and 45 = 1, 0 = otherwise.	0.177	0.382	0	1
Age46to55	Respondents who, in 2008, were aged between 46 and 55 = 1, 0 = otherwise.	0.177	0.382	0	1
Age56to65	Respondents who, in 2008, were aged between 56 and 65 = 1, 0 = otherwise.	0.148	0.355	0	1
Age66to75	Respondents who, in 2008, were aged between 66 and 75 = 1, 0 = otherwise.	0.113	0.317	0	1
Age76plus	Respondents who, in 2008, were aged 76 and over = 1, 0 = otherwise.	0.061	0.240	0	1

(Source: Author's own)

Table 3.4.4 continued: Description of Variables and Summary Statistics, Chapter 5

Variable	Variable Description	Mean	Standard Error	Min	Max
Relvimp	Respondents who state that religion is very important in their live = 1, 0 = otherwise.	0.265	0.441	0	1
Relqimp (base)	Respondents who state that religion is quite important in their live = 1, 0 = otherwise.	0.314	0.464	0	1
Relnimp	Respondents who state that religion is not important in their live = 1, 0 = otherwise.	0.242	0.428	0	1
Relnalimp	Respondents who state that religion is not at all important in their live = 1, 0 = otherwise.	0.165	0.371	0	1
Healthvgood	Respondents who describe their state of health as very good = 1, 0 = otherwise.	0.207	0.405	0	1
Healthgood (base)	Respondents who describe their state of health as good = 1, 0 = otherwise.	0.396	0.489	0	1
Healthfair	Respondents who describe their state of health as fair = 1, 0 = otherwise.	0.288	0.453	0	1
Healthpoor	Respondents who describe their state of health as poor = 1, 0 = otherwise.	0.087	0.282	0	1
Healthvpoor	Respondents who describe their state of health as very poor = 1, 0 = otherwise.	0.018	0.134	0	1
Jobdissatisfied	Respondents satisfaction with job at a scale of 1 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.010	0.100	0	1
Jobsatisfied2	Respondents satisfaction with job at a scale of 2 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.007	0.082	0	1
Jobsatisfied3	Respondents satisfaction with job at a scale of 3 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.015	0.120	0	1
Jobsatisfied4	Respondents satisfaction with job at a scale of 4 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.018	0.134	0	1

(Source: Author's own)

Table 3.4.4 continued: Description of Variables and Summary Statistics, Chapter 5

Variable	Variable Description	Mean	Standard Error	Min	Max
Jobsatisfied5	Respondents satisfaction with job at a scale of 5 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.045	0.208	0	1
Jobsatisfied6	Respondents satisfaction with job at a scale of 6 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.045	0.208	0	1
Jobsatisfied7	Respondents satisfaction with job at a scale of 7 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.079	0.270	0	1
Jobsatisfied8 (base)	Respondents satisfaction with job at a scale of 8 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.119	0.323	0	1
Jobsatisfied9	Respondents satisfaction with job at a scale of 9 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.071	0.256	0	1
Jobsatisfied	Respondents satisfaction with job at a scale of 10 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.081	0.272	0	1
Male	Respondent is male = 1, 0 = otherwise.	0.445	0.497	0	1
Female (base)	Respondent is female = 1, 0 = otherwise.	0.555	0.497	0	1
Married (base)	Respondents legal marital status is married = 1, 0 = otherwise.	0.539	0.499	0	1
Registered Partnership	Respondents legal marital status is registered partnership = 1, 0 = otherwise.	0.018	0.134	0	1
Widowed	Respondents legal marital status is widowed = 1, 0 = otherwise.	0.104	0.305	0	1

(Source: Author's own)

Table 3.4.4 continued: Description of Variables and Summary Statistics, Chapter 5

Variable	Variable Description	Mean	Standard Error	Min	Max
Divorced	Respondents legal marital status is divorced = 1, 0 = otherwise.	0.068	0.251	0	1
Separated	Respondents legal marital status is separated = 1, 0 = otherwise.	0.014	0.119	0	1
NeverMarried	Respondents legal marital status is never married or never registered partnership = 1, 0 = otherwise.	0.251	0.433	0	1
EmpM30 (base)	Respondent has paid employment of 30 hours a week or more = 1, 0 = otherwise.	0.385	0.487	0	1
EmpL30	Respondent has paid employment of less than 30 hours a week = 1, 0 = otherwise.	0.057	0.232	0	1
EmpSelf	Respondent has paid self-employment = 1, 0 = otherwise.	0.059	0.235	0	1
EmpMilitary	Respondent has paid military-employment = 1, 0 = otherwise.	0.001	0.031	0	1
EmpRetired	Respondent has no paid employment and is retired/pensioned = 1, 0 = otherwise.	0.219	0.414	0	1
EmpHousewife	Respondent has no paid employment and is a housewife not otherwise employed = 1, 0 = otherwise.	0.088	0.284	0	1
EmpStudent	Respondent has no paid employment and is a student = 1, 0 = otherwise.	0.063	0.243	0	1
EmpUnemployed	Respondent has no paid employment and is unemployed = 1, 0 = otherwise.	0.100	0.299	0	1
EmpDisability	Respondent has no paid employment resulting from disability = 1, 0 = otherwise.	0.015	0.123	0	1
EmpOther	Respondent has no paid employment due to other factors = 1, 0 = otherwise.	0.006	0.074	0	1

(Source: Author's own)

3.5: Variables used when Estimating the Effect of Income-Inequality on Individual Well-Being Levels in Europe

The empirical analysis when estimating the relationship between well-being and income inequality (similar to when examining the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe) is based on the survey results of the integrated 2008 wave of the EVS where 67,786 valid interviews were conducted. For a comprehensive overview of the EVS 2008 integrated data see Section 3.4. The dependent variable of this thesis is based on the subjective, self-reported measure of well-being specifically that of happiness and life satisfaction. For a comprehensive overview of the EVS 2008 integrated data on happiness and life satisfaction see subsections 3.4.1.1 and 3.4.1.2.

A primary explanatory variable, when estimating the effect of income-inequality on individual well-being levels in Europe, is household income, derived from the 2008 EVS integrated data. For a broad overview of the EVS 2008 integrated data on monthly household income, happiness and monthly household income and life satisfaction and monthly household income see subsections 3.4.2, 3.4.2.1 and 3.4.2.2 chronologically. The other primary explanatory variable, when estimating the effect of income-inequality on individual well-being levels in Europe, is national income. The national income variable is GDP per capita measured at PPP in current international $ obtained from the World Bank's, International Comparison Program database. For a comprehensive summary of the national income data for each of the nations included in the 2008 wave of the EVS see Subsection 3.4.3. For an inclusive overview of national income and happiness and life satisfaction in Europe 2008 see subsections 3.4.3.1 and 3.4.3.2 chronologically.

3.5.1: National Income Inequality

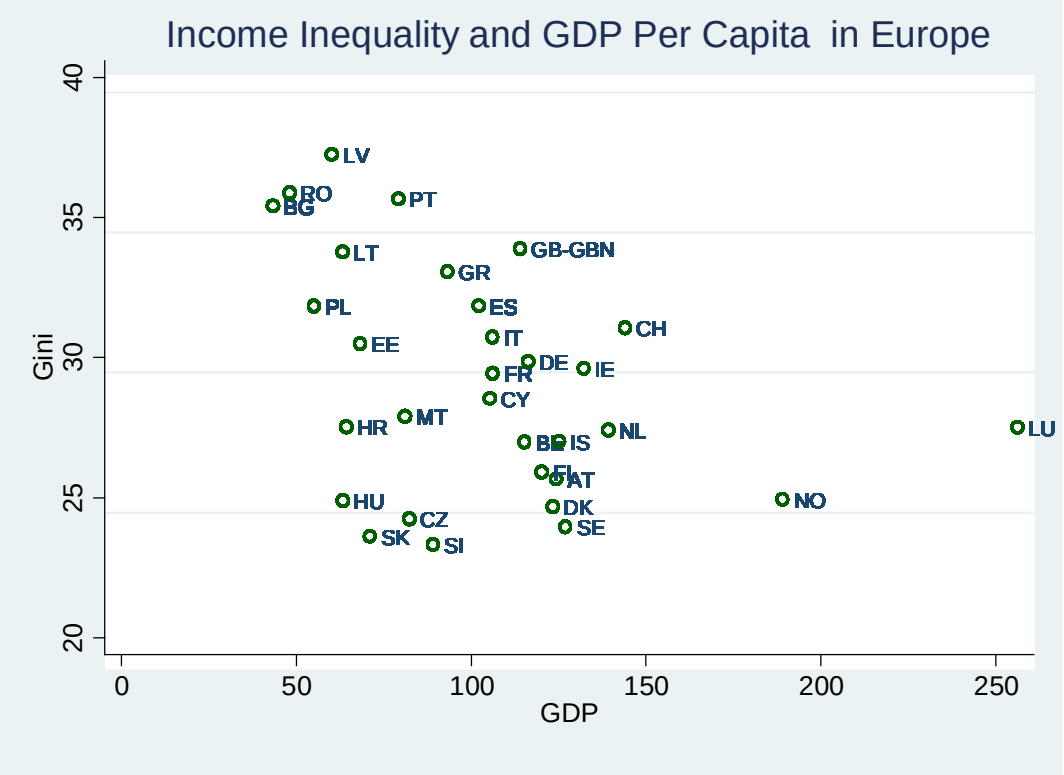
The main explanatory variable “national income inequality” is measured by the Gini coefficient obtained from 2008 Eurostat data. Most economic literature concerned with the relationship between well-being and income inequality use the Gini coefficient as a measurement of income inequality (Alesina *et al.,* 2004; Senik, 2004; Graham & Felton, 2006). Eurostat is the statistical office of the European Union located in Luxembourg. Eurostat defines the Gini coefficient as the relationship of cumulative shares of the population arranged according to the level of equivalised disposable income, to the cumulative share of the equivalised total disposable income received by them. Participating nations in the 2008 EVS, with available gini coefficients and GDP in PPP, are illustrated in Table 3.5.1 and Figure 3.5.1.

Table 3.5.1: Country Abbreviations, Gini Coefficients and GDP, Europe 2008

Country	Country Abbreviation	2008 Gini Coefficient	2008 GDP Per Capita in PPP
Austria	AT	26.2	41,151.6
Belgium	BE	27.5	37,953.8
Bulgaria	BG	35.9	14,565.9
Croatia	HB	28	20,464.4
Cyprus	CY	29	31,815.6
Czech Republic	CZ	24.7	27,111.5
Denmark	DK	25.1	40,838.2
Estonia	EE	30.9	22,500.4
Finland	FI	26.3	39,729.6
France	FR	29.8	35,144.0
Germany	DE	30.2	38,382.9
Great-Britain	GB-GBN	33.9	37,753.0
Greece	GR	33.4	30,872.5
Hungary	HU	25.2	20,742.4
Iceland	IS	27.3	41,528.5
Ireland	IE	29.9	43,743.6
Italy	IT	31	35,187.8
Latvia	LV	37.5	18,827.9
Lithuania	LT	34	20,617.5
Luxembourg	LU	27.7	84,733.6
Malta	MT	28.1	25,462.1
The Netherlands	NL	27.6	45,897.1
Norway	NO	25.1	61,342.1
Poland	PL	32	18,046.2
Portugal	PT	35.8	26,095.8
Romania	RO	36	15,694.3
Slovak Republic	SK	23.7	23,786.7
Slovenia	SI	23.4	29,598.1
Spain	ES	31.9	33,729.5
Sweden	SE	24	41,880.8
Switzerland	CH	31.1	50,438.8

(Source: Author's own)

Figure 3.5.1: Gini Coefficients and GDP, Europe 2008

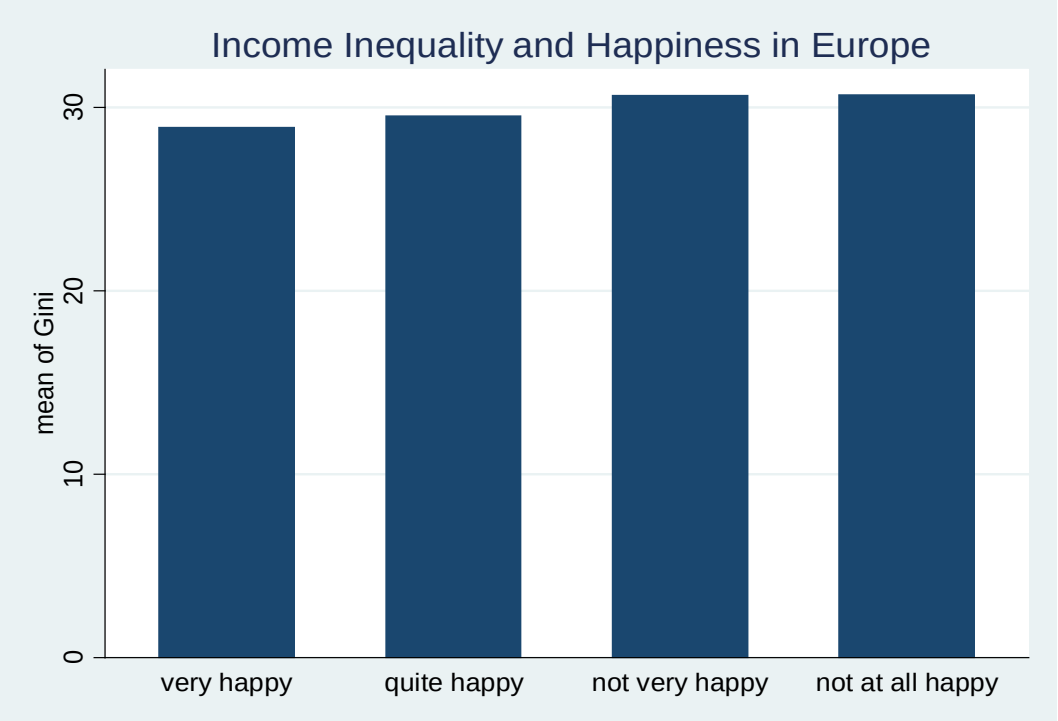


(Source: Author's own)

3.5.1.1: Happiness and Income Inequality

Figure 3.5.1.1a displays the average national income inequality by happiness of interviewees in the 2008 EVS. This figure can be enlisted to broadly decide if any relationship between happiness and national income inequality exists. Intuitively a negative relationship between happiness and national income inequality is depicted. There appears to be an increase in average national income inequality as one reduces happiness levels. Thus, on average individuals who report a happiness level of "very happy" are residents in European nations with the lowest income inequality. This is followed by individuals who report a happiness level of "quite happy", "not very happy" and finally individuals who report a happiness level of "not at all happy" are, on average, residents in European nations with the highest income inequality. Figure 3.5.1.1b presents the average happiness levels by national income inequality of 2008 EVS respondents. Intuitively there also seems to be a slight negative relationship between national income inequality and happiness portrayed in Figure 3.5.1.1b.

Figure 3.5.1.1a: Average National Income Inequality of Individuals in Each of the Happiness Levels in Europe, EVS 2008



(Source: Author's own)

Figure 3.5.1.1b: Happiness and Average National Income Inequality in Europe, EVS 2008

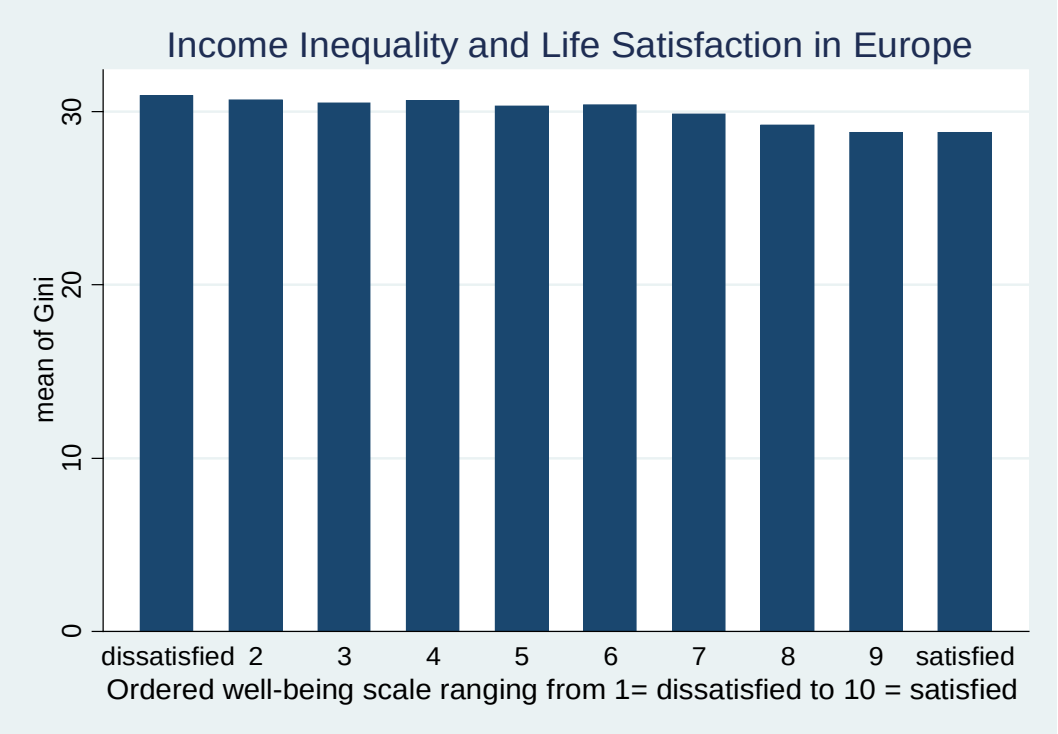


(Source: Author's own)

3.5.1.2: Life Satisfaction and Income Inequality

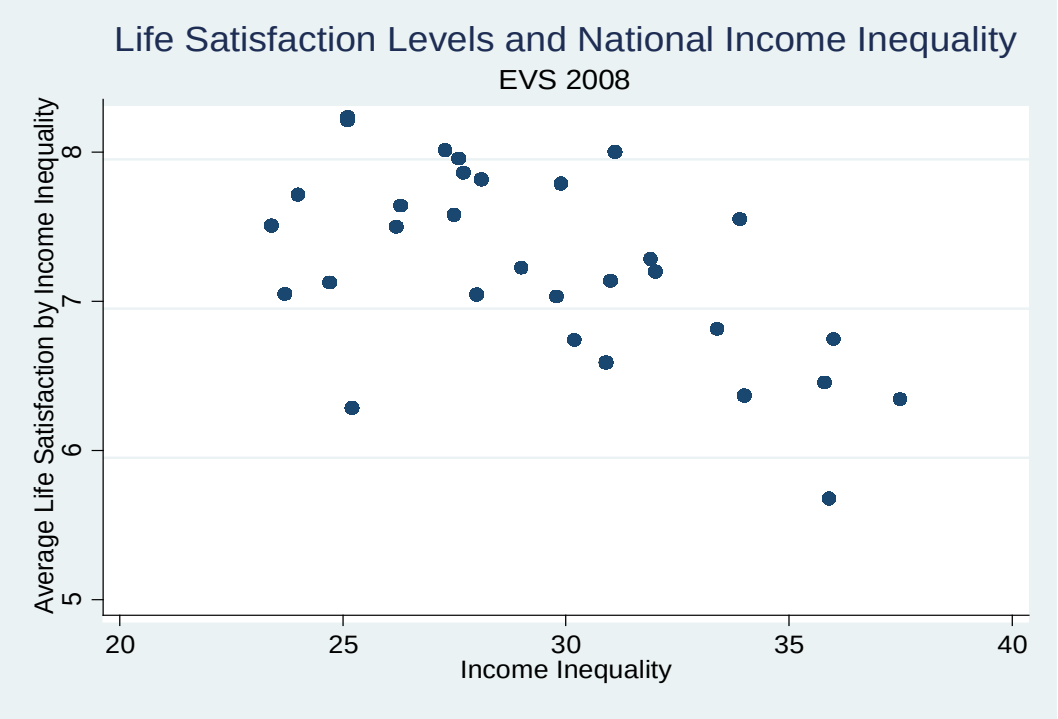
Figure 3.5.1.2a illustrates the average national income inequality by life satisfaction of respondents in the 2008 EVS. Here it may be seen if any relationship between life satisfaction and national income inequality exists. Instinctively a negative relationship between life satisfaction and national income inequality is illustrated. There appears to be a reduction in average national income inequality as one increases life satisfaction levels. Figure 3.5.1.2b depicts average life satisfaction levels by national income inequality of candidates of the 2008 EVS. Intuitively a slight negative relationship between life satisfaction and national income inequality appears to be depicted.

Figure 3.5.1.2a: Average National Income Inequality of Individuals in Each of the Life Satisfaction Levels in Europe, EVS 2008



(Source: Author's own)

Figure 3.5.1.2b: Life Satisfaction and Average National Income Inequality in Europe, EVS 2008



(Source: Author's own)

3.5.2: Other Independent Variables and Descriptive Statistics

When estimating the effect of income-inequality on individual well-being levels in Europe, numerous variables which have been found to determine well-being in previous economic literature are also accounted for. Apart from the income related variables, the included correlates and precipitators of individual well-being are health, religion, employment, gender, job satisfaction, age and marital status.

Understanding of these well-being determinants has been increased through much economic literature in this area. What follows in Table 3.5.2 is the descriptive statistics of all the variables included when estimating the effect of income-inequality on individual well-being levels in Europe.

Table 3.5.2: Description of Variables and Summary Statistics, Chapter 6

Variable	Variable Description	Mean	Standard Error	Min	Max
Happy (dependent variable)	Respondents were asked "Taking all things together how happy are you?" with the option of choosing: 1: not at all happy, 2: not very happy, 3: quite happy, 4: very happy.	3.028	0.697	1	4
Satisfiedlife (dependent variable)	Respondents were asked "How satisfied are you with your life?" ranking their responses from 1(dissatisfied) to 10 (satisfied).	6.972	2.323	1	10
Gini	The Gini coefficient-measurement of national income inequality.	27.925	7.771	0	37.5
GDP	National GDP in PPP obtained from the World Bank's database.	24314.780	17748.860	0	94398.39
Absolutincome	Respondent's annual household income in Dollars for PPP.	16779.860	21541.410	1200	160000
Age15to25	Respondents who, in 2008, were aged between 15 and 25 = 1, 0 = otherwise.	0.146	0.354	0	1
Age26to35	Respondents who, in 2008, were aged between 26 and 35 = 1, 0 = otherwise.	0.172	0.378	0	1
Age36to45 (base)	Respondents who, in 2008, were aged between 36 and 45 = 1, 0 = otherwise.	0.177	0.382	0	1
Age46to55	Respondents who, in 2008, were aged between 46 and 55 = 1, 0 = otherwise.	0.177	0.382	0	1
Age56to65	Respondents who, in 2008, were aged between 56 and 65 = 1, 0 = otherwise.	0.148	0.355	0	1
Age66to75	Respondents who, in 2008, were aged between 66 and 75 = 1, 0 = otherwise.	0.113	0.317	0	1
Age76plus	Respondents who, in 2008, were aged 76 and over = 1, 0 = otherwise.	0.061	0.240	0	1

(Source: Author's own)

Table 3.5.2 continued: Description of Variables and Summary Statistics, Chapter 6

Variable	Variable Description	Mean	Standard Error	Min	Max
Relvimp	Respondents who state that religion is very important in their live = 1, 0 = otherwise.	0.265	0.441	0	1
Relqimp (base)	Respondents who state that religion is quite important in their live = 1, 0 = otherwise.	0.314	0.464	0	1
Relnimp	Respondents who state that religion is not important in their live = 1, 0 = otherwise.	0.242	0.428	0	1
Relnalimp	Respondents who state that religion is not at all important in their live = 1, 0 = otherwise.	0.165	0.371	0	1
Healthvgood	Respondents who describe their state of health as very good = 1, 0 = otherwise.	0.207	0.405	0	1
Healthgood (base)	Respondents who describe their state of health as good = 1, 0 = otherwise.	0.396	0.489	0	1
Healthfair	Respondents who describe their state of health as fair = 1, 0 = otherwise.	0.288	0.453	0	1
Healthpoor	Respondents who describe their state of health as poor = 1, 0 = otherwise.	0.087	0.282	0	1
Healthvpoor	Respondents who describe their state of health as very poor = 1, 0 = otherwise.	0.018	0.134	0	1
Jobdissatisfied	Respondents satisfaction with job at a scale of 1 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.010	0.100	0	1
Jobsatisfied2	Respondents satisfaction with job at a scale of 2 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) =1, 0 = otherwise.	0.007	0.082	0	1
Jobsatisfied3	Respondents satisfaction with job at a scale of 3 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.015	0.120	0	1
Jobsatisfied4	Respondents satisfaction with job at a scale of 4 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.018	0.134	0	1

(Source: Author's own)

Table 3.5.2 continued: Description of Variables and Summary Statistics, Chapter 6

Variable	Variable Description	Mean	Standard Error	Min	Max
Jobsatisfied5	Respondents satisfaction with job at a scale of 5 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.045	0.208	0	1
Jobsatisfied6	Respondents satisfaction with job at a scale of 6 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.045	0.208	0	1
Jobsatisfied7	Respondents satisfaction with job at a scale of 7 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.079	0.270	0	1
Jobsatisfied8 (base)	Respondents satisfaction with job at a scale of 8 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.119	0.323	0	1
Jobsatisfied9	Respondents satisfaction with job at a scale of 9 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.071	0.256	0	1
Jobsatisfied	Respondents satisfaction with job at a scale of 10 (scale 1 to 10, 1 = dissatisfied, 10 = satisfied) = 1, 0 = otherwise.	0.081	0.272	0	1
Male	Respondent is male = 1, 0 = otherwise.	0.445	0.497	0	1
Female (base)	Respondent is female = 1, 0 = otherwise.	0.555	0.497	0	1
Married (base)	Respondents legal marital status is married = 1, 0 = otherwise.	0.539	0.499	0	1
Registered Partnership	Respondents legal marital status is registered partnership = 1, 0 = otherwise.	0.018	0.134	0	1
Widowed	Respondents legal marital status is widowed = 1, 0 = otherwise.	0.104	0.305	0	1

(Source: Author's own)

Table 3.5.2 continued: Description of Variables and Summary Statistics, Chapter 6

Variable	Variable Description	Mean	Standard Error	Min	Max
Divorced	Respondents legal marital status is divorced = 1, 0 = otherwise.	0.068	0.251	0	1
Separated	Respondents legal marital status is separated = 1, 0 = otherwise.	0.014	0.119	0	1
NeverMarried	Respondents legal marital status is never married and never registered partnership = 1, 0 = otherwise.	0.251	0.433	0	1
EmpM30 (base)	Respondent has paid employment of 30 hours a week or more = 1, 0 = otherwise.	0.385	0.487	0	1
EmpL30	Respondent has paid employment of less than 30 hours a week = 1, 0 = otherwise.	0.057	0.232	0	1
EmpSelf	Respondent has paid self-employment = 1, 0 = otherwise.	0.059	0.235	0	1
EmpMilitary	Respondent has paid military-employment = 1, 0 = otherwise.	0.001	0.031	0	1
EmpRetired	Respondent has no paid employment and is retired/pensioned = 1, 0 = otherwise.	0.219	0.414	0	1
EmpHousewife	Respondent has no paid employment and is a housewife not otherwise employed = 1, 0 = otherwise.	0.088	0.284	0	1
EmpStudent	Respondent has no paid employment and is a student = 1, 0 = otherwise.	0.063	0.243	0	1
EmpUnemployed	Respondent has no paid employment and is unemployed = 1, 0 = otherwise.	0.100	0.299	0	1
EmpDisability	Respondent has no paid employment resulting from disability = 1, 0 = otherwise.	0.015	0.123	0	1
EmpOther	Respondent has no paid employment due to other factors = 1, 0 = otherwise.	0.006	0.074	0	1

(Source: Author's own)

3.6: Chapter Conclusion

This thesis, in order to explore the possible explanations of the inconsistent findings provided by Easterlin (1974) uses cross-sectional data obtained from the EVS 2008. The EVS is a large-scale, cross-national survey research program which concerns itself with human values (EVS, 2011). In particular it provides insight into the opinion's on family, work, religion, politics and society of European citizens.

The empirical analysis of this thesis is based on the subjective, self-reported measure of well-being namely, happiness and life satisfaction. Life satisfaction data is derived from the following EVS question: *"How satisfied are you with your life?"* Interviewees ranked their responses on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Life satisfaction refers to the overall cognitive evaluation of an individual's own life. Happiness data is derived from the EVS question which reads as follows: *"All things together how happy are you?*" Interviewees ranked their responses on an ordered scale, with the options of choosing "not at all happy", "not very happy", "quite happy" or "very happy". Happiness refers to immediate positive or negative emotions experienced by an individual when considering all aspects of their life.

Well-being research departs from the neoclassical economic custom of deriving utility purely from income as arbitrated by consumer preferences and choice. Self-reported measures of well-being are identified as adequate indicators of individual happiness and life satisfaction (Dolan & White, 2007) as extensive research finds that individuals are able to consistently evaluate their own state of well-being (Frey & Stutzer, 2003). Indeed, self-reported measures have been identified as the best indicator of individual well-being (Frey & Stutzer, 2003).

In this chapter a comprehensive review of the EVS 2008 Irish (Section 3.3) and integrated (Section 3.4) data is presented. This thesis is primarily concerned with the relationship between well-being and income. Therefore, this chapter exhibits preliminary bivariate analysis and cross tabulations of the well-being-income relationship. Primarily a positive relationship between well-being and national and individual income is depicted in Europe and Ireland. However, the increase in well-

being, associated with income, seems to decline as income increases. This finding highlights the theory of diminishing marginal utility of income. This thesis is also concerned with the relationship between well-being and income inequality. This chapter (Section 3.5) displays preliminary bivariate analysis of the well-being-income-inequality relationship. Intuitively a negative relationship between well-being and national income inequality is depicted for Europe.

This chapter also contains the descriptive statistics of the dependent and independent variables, which determine the well-being-income relationship, employed in Chapter 4, Chapter 5 and Chapter 6 of this thesis.

CHAPTER 4

ESTIMATION OF THE EFFECT OF ABSOLUTE, REFERENCE AND RELATIVE INCOME ON INDIVIDUAL WELL-BEING LEVELS IN IRELAND

The aim of this thesis is to explore the possible explanations of the apparent contradictory results provided by Easterlin (1974) by using cross sectional data of European residents obtained from the 2008 wave of the EVS. Easterlin (1974) reports that average national well-being is unrelated to GDP per head. At the same time, Easterlin (1974) shows that, in the microeconomic literature, there is a statistically significant positive correlation between individual measures of subjective well-being and individual income. The aim of this thesis is achieved by estimating the well-being-income relationship in many different ways.

This chapter presents an empirical analysis of the importance of absolute, reference and relative income on individual well-being in Ireland. Two distinct sets of regression results, permitting the use of the two well-being definitions, are evaluated when testing the four chief hypotheses: Firstly, if individual income results in a positive effect on individual well-being; Secondly, whether reference group income has a negative effect on individual well-being; Thirdly, whether relative income affects individual well-being in a positive way; And lastly, whether the effect of income on well-being is affected by the diverse definitions of well-being, specifically that of happiness and life satisfaction.

This chapter presents the results from ordered probit estimations of the basic well-being equation and the estimated marginal effects. This chapter is comprised of six sections. Section 4.1 discusses the empirical techniques. Section 4.2 estimates absolute, reference and relative income results. Section 4.3 presents results from the additional explanatory variables. Section 4.4 describes the difference between life satisfaction and happiness results. Section 4.5 outlines the post estimation diagnostics. Section 4.6 concludes.

4.1: Empirical Techniques

This chapter provides an empirical analysis of the influence of absolute, reference and relative income on individual well-being in Ireland. Four major hypotheses are tested:

- Firstly, if individual income causes a positive effect on individual well-being.
- Secondly, if reference group income results in a negative effect on individual well-being.
- Thirdly, whether relative income has a positive effect on individual well-being.
- Fourthly, whether the influence of income on well-being is affected by the varied definitions of well-being, specifically that of happiness and life satisfaction.

The empirical assessment of this chapter is estimated by applying the ordered probit technique to Irish data from the EVS 2008. A subjective self-reported measure of life satisfaction and happiness is employed in order to measure individual well-being levels. The computer package used in this chapter is Stata, Version 13. The sample means and standard deviations for the dependent and independent variables can be seen in Table 3.3.3 in Chapter 3.

The empirical analysis of this chapter is founded on three different specifications of equation (4.1). Various included control variables are correlated with individual income and therefore including these variables, when determining the relationship between subjective well-being and income, is necessitated (Ferrer-i-Carbonell, 2005). The inclusion of particular control variables is based on previous economic literature and data availability. The subsequent equation portrays the assumed relationship for each individual *i* at a particular (constant) time *t*.

$$WB = SWB\ (y, y_r\ , X) \qquad \textbf{(4.1)}$$

Where:

WB	=	the economic concept of welfare or well-being
y	=	absolute family income
y_r	=	reference group income
X	=	the vector of variables including individual and household socio-economic and demographic characteristics

The set of control variables "*X*" employed in this chapter include: gender, health, employment status, job satisfaction, region, religion and age. In order to test the four hypotheses the empirical analysis, of this chapter, is based on three various specifications of equation (4.1). To test whether individual income results in a positive effect on individual well-being the specification includes, in addition to *X*, merely absolute annual household income as a determinant of subjective well-being. In the EVS respondents did not record exact annual household income figures, instead determining (from 12 categories) which annual household income category they fell into. In order to acquire an absolute annual household income measure a new absolute income variable was created for each individual. An individual's absolute income was made equal to the middle income of the appropriate income group. For example, if individual *i* stated an annual household income level of €36,000 to €60,000, then *i*'s absolute income is equal to €48,000. In relation to the lowest category (an annual household income of 1,800 euros or less) two thirds (1,200 euros) of the upper threshold of this category was made equal to the absolute income level. Concerning the highest category (an annual household income of 120,000 euro or more) one third of the income threshold (40,000 euros) was added to the income threshold (120,000 euros) in order to compute an absolute income level of 160,000 euros. This derivation is consistent with that done by McBride (2001). The well-being function is primarily believed to be concave in income (Ferrer-i-Carbonell, 2005) and subsequently this thesis presents absolute income in logarithmic form.

To test whether reference group income results in a negative effect on individual well-being the specification includes, in addition to *X*, absolute annual household income and reference group income as determinants of subjective well-being. This thesis defines the reference group as individuals who are living in the same region, possess

the same education level and are in the age range of five years younger and five years older than the individual concerned. This definition is similar to that used by Ferrer-i-Carbonell (2005). This thesis defines the reference group income as the average income of all individuals in the reference group. Few economic empirical analyses, which focus on well-being and income, account for reference group income. Some studies that do are Clark and Oswald (1996), Kapteyn and Van Herwaarden (1980), Kapteyn *et al.*, (1997), McBride (2001) and Ferrer-i-Carbonell (2005). These studies all find reference group income to have a negative effect on individual well-being. As with absolute annual household income this thesis presents reference group income in logarithmic form.

To test whether relative income results in a positive effect on individual well-being the specification includes, in addition to *X*, absolute annual household income and relative income as determinants of subjective well-being. In this thesis the term relative income refers to a person's position in the income distribution. This is consistent with the definition used by Blanchflower and Oswald (2004a). Blanchflower and Oswald (2004a: 16) define the relative income variable as "*the ratio of the individual's income to the state income per capita*". EVS data does not possess a relative income variable and therefore, one was derived by implementing the following steps:

i. Firstly, as previously described, the reference group is identified. The reference group is defined as individuals who are living in the same region, possess the same education level and are in the age range of five years younger and five years older than the individual concerned (Ferrer-i-Carbonell, 2005).

ii. Secondly, the reference income of the identified reference groups, is calculated. The reference income is defined as the average income of all individuals in the same reference group (Ferrer-i-Carbonell, 2005). The reference income is derived as the sum of the absolute income of all individuals in each reference group divided by the number of individuals in that precise reference group.

iii. Thirdly, relative income is derived. This is done by calculating the difference between the logarithm of individual's absolute annual household income and the logarithm of reference income. Thus, relative income = log absolute income-log reference income.

To test whether the effect of income on well-being is affected by the different definitions of well-being the first three hypotheses are tested twice. Firstly the EVS happiness variable and secondly EVS life satisfaction variable are used as a measure of well-being. Results from both well-being regressions are then distinguished.

The analysis of the β coefficients are in terms of the underlying latent variable model where a positive β coefficient signifies that the corresponding variable raises the latent dependent variable (Verbeek, 2002). Alternatively a negative β coefficient indicates that the corresponding variable reduces the latent dependent variable (Verbeek, 2002). The explanatory variable's coefficients may only be interpreted qualitatively (Maddala, 1983; Jones, 2007). The results of this chapter should be interpreted as follows: a positive β coefficient means that the corresponding variable raises individual well-being and a negative β value specifies that the corresponding variable decreases individual well-being.

For a more comprehensive analysis the quantitative effects are also explained using marginal effects which are the predicted probabilities of a dependent (well-being) outcome occurring (Clark, 1998). The significance of included variables are evaluated by using the Z-statistics and their associated p-values to determine statistical significance at the traditional 1%, 5% and 10% levels. Dependent and predictor variable results are discussed in the forthcoming subsections of this chapter.

4.2: Discussion of Absolute, Reference and Relative Income Results

In this chapter the three well-being equations are estimated via an ordered probit model using Irish data from the EVS 2008. Table 4.2 tests whether individual income results in a positive effect on individual well-being. Table 4.2.1 tests whether reference group income results in a negative effect on individual well-being. Table 4.2.2 determines whether relative income results in a positive effect on individual well-being.

Absolute Income

Table 4.2 tests the first hypothesis by estimating the effect of absolute annual household income on individual well-being using an ordered probit model. Two distinct sets of regression results, permitting the use of the two well-being definitions, are evaluated[4.2]. In Model 1 happiness is the dependent variable. Life satisfaction is the dependent variable in Model 2.

Model 1 in Table 4.2 approximates the relationship between happiness and absolute income when a number of personal and socio-economic control variables are included. The coefficient on the log of annual absolute household income is highly significant and positive which suggests that higher absolute income has a significant positive effect on Happiness in Ireland. In Table 4.2(a) the marginal effects illustrate that increasing absolute income raises the probability of reporting oneself as "very happy" by 7.4 percentage points.

Model 2 in Table 4.2 measures the effect of absolute income on life satisfaction. The absolute income coefficient in Model 2 is positive and statistically significant at the 1% level. This indicates that larger absolute household income results in higher life satisfaction. In Table 4.2(a) the marginal effects illustrate that increasing absolute income increases the probability of reporting a life satisfaction level of 10 by 6.4%.

[4.2] Model 1 is an ordered probit regression estimating the happiness-absolute-income gradient for all Irish citizens where several standard demographic and individual control variables are included.
Model 2 is an ordered probit regression estimating the life-satisfaction-absolute-income gradient for all Irish citizens where several standard demographic and individual control variables are included.

These absolute income results for Ireland are in accordance with previous economic findings: namely that richer individuals in a particular nation, *ceteris paribus*, report higher levels of well-being than fellow-citizens at the bottom of the income distribution (Easterlin, 1974; Frey & Stutzer, 2000a). This absolute income finding is consistent with the Easterlin paradox. This positive relationship is vastly documented in the well-being literature (Easterlin, 1995; 2001; Shields & Price, 2005; Graham & Pettinato, 2002; Lelkes, 2006b). No literature has been identified that contradicts this finding (Easterlin, 2001).

Table 4.2: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Absolute Income Being the Primary Independent Variable

Variable Name	Happiness Coefficient (β) and Z-Stat (1)	Life Satisfaction Coefficient (β) and Z-Stat (2)
In(Absoluteincome)	0.189** (2.33)	0.353*** (4.97)
Relvimp	0.271** (2.04)	0.014 (0.12)
Relnimp	-0.056 (-0.4)	-0.085 (-0.72)
Relnalimp	-0.350* (-1.93)	-0.141 (-0.88)
Healthgood	-0.433*** (-3.7)	-0.227** (-2.24)
Healthfair	-0.629*** (-3.83)	-0.584*** (-4.03)
Healthpoor	-1.769*** (-5.83)	-1.395*** (-5.14)
Healthvpoor	-0.481 (-0.79)	-0.626 (-1.18)
Jobdissatied	0.745 (0.6)	-0.734 (-0.69)
Jobsatisfied2	-0.019 (-0.02)	-0.029 (-0.04)
Jobsatisfied4	-0.775* (-1.74)	-0.995** (-2.54)
Jobsatisfied5	0.461 (1.04)	-1.099*** (-2.97)
Jobsatisfied6	-0.287 (-0.83)	-1.011*** (-3.34)
Jobsatisfied7	-0.255 (-1.22)	-0.555*** (-3.07)
Jobsatisfied8	-0.341* (-1.83)	-0.418** (-2.57)
Jobsatisfied9	0.196 (0.98)	-0.191 (-1.12)
Male	0.005 (0.04)	-0.105 (-1.01)
EmpL30	-0.054 (-0.27)	0.175 (1.01)
EmpSelf	-0.131 (-0.52)	-0.014 (-0.06)
EmpRetired	-0.061 (-0.26)	-0.216 (-1.05)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 4.2 continued: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Absolute Income Being the Primary Independent Variable

Variable Name	Happiness Coefficient (β) and Z-Stat (1)	Life Satisfaction Coefficient (β) and Z-Stat (2)
EmpHousewife	-0.120 (-0.64)	-0.282* (-1.73)
EmpStudent	0.378 (0.79)	-0.865** (-2.14)
EmpUnemploye	-0.407* (-1.74)	-0.529** (-2.57)
EmpDisability	-0.233 (-0.5)	-0.705* (-1.68)
EmpOther	0.054 (0.09)	0.655 (1.17)
Age17to25	-0.491** (-2.45)	-0.188 (-1.08)
Age36to45	-0.468*** (-2.94)	-0.260* (-1.9)
Age46to55	-0.323* (-1.89)	-0.203 (-1.39)
Age56to65	-0.438** (-2.27)	-0.039 (-0.23)
Age66to75	-0.192 (-0.83)	0.178 (0.89)
Age76plus	-0.312 (-1.18)	0.334 (1.43)
SouthWest	-0.130 (-0.79)	0.233 (1.64)
SouthEast	-0.065 (-0.37)	0.559*** (3.61)
MidWest	-0.278 (-1.48)	0.504*** (3.02)
MidEast	0.269 (1.12)	0.493** (2.44)
West	-0.333* (-1.82)	0.266* (1.65)
Midland	-0.137 (-0.73)	0.044 (0.27)
Border	-0.354* (-1.67)	0.039 (0.21)
Model Summary		
Observations	579	580
LR chi2	107.95	157.92
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1031	0.0742
Log likelihood	-469.55324	-985.05722

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 4.2(a): Marginal Effects of the Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Absolute Income Being the Primary Independent Variable

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
In(Absoluteincome)	0.074** (2.33)	0.064*** (4.69)
Relvimp	0.106** (2.03)	0.003 (0.12)
Relnimp	-0.022 (-0.41)	-0.015 (-0.74)
Relnalimp	-0.131** (-2.05)	-0.024 (-0.95)
Healthgood	-0.166*** (-3.8)	-0.040** (-2.28)
Healthfair	-0.225*** (-4.35)	-0.081*** (-4.97)
Healthpoor	-0.411*** (-14.73)	-0.108*** (-8.17)
Healthvpoor	-0.172 (-0.9)	-0.075** (-2.01)
Jobdissatied	0.287 (0.67)	-0.081 (-1.36)
Jobsatisfied2	-0.007 (-0.02)	-0.005 (-0.04)
Jobsatisfied4	-0.256** (-2.3)	-0.094*** (-5.56)
Jobsatisfied5	0.182 (1.06)	-0.098*** (-6.53)
Jobsatisfied6	-0.107 (-0.88)	-0.096*** (-6.45)
Jobsatisfied7	-0.096 (-1.27)	-0.075*** (-4.08)
Jobsatisfied8	-0.128* (-1.92)	-0.062*** (-3.13)
Jobsatisfied9	0.077 (0.97)	-0.031 (-1.24)
Male	0.002 (0.04)	-0.019 (-1.02)
EmpL30	-0.021 (-0.27)	0.034 (0.93)
EmpSelf	-0.050 (-0.53)	-0.002 (-0.06)
EmpRetired	-0.024 (-0.26)	-0.035 (-1.16)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 4.2(a) continued: Marginal Effects of the Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Absolute Income Being the Primary Independent Variable

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
EmpHousewife	-0.047 (-0.65)	-0.046* (-1.93)
EmpStudent	0.150 (0.8)	-0.089*** (-4.39)
EmpUnemploye	-0.150* (-1.89)	-0.071*** (-3.52)
EmpDisability	-0.088 (-0.52)	-0.080*** (-3.02)
EmpOther	0.021 (0.09)	0.168 (0.91)
Age17to25	-0.178*** (-2.7)	-0.031 (-1.2)
Age36to45	-0.174*** (-3.14)	-0.043** (-2.08)
Age46to55	-0.122** (-1.97)	-0.034 (-1.51)
Age56to65	-0.161** (-2.44)	-0.007 (-0.24)
Age66to75	-0.074 (-0.85)	0.035 (0.82)
Age76plus	-0.117 (-1.25)	0.072 (1.23)
SouthWest	-0.050 (-0.8)	0.047 (1.49)
SouthEast	-0.025 (-0.37)	0.129*** (2.94)
MidWest	-0.105 (-1.54)	0.115** (2.48)
MidEast	0.107 (1.12)	0.114** (1.99)
West	-0.125* (-1.93)	0.055 (1.47)
Midland	-0.053 (-0.74)	0.008 (0.27)
Border	-0.131* (-1.78)	0.007 (0.21)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Reference Income

Using an ordered probit model Table 4.2.1 examines the second hypothesis by assessing the effect of reference income on individual well-being. Separate regressions using firstly, the happiness dependent variable (Model 1) and secondly the life satisfaction dependent variable (Model 2) are illustrated[4.2.1].

Model 1 in Table 4.2.1 approximates the consequence of reference income on happiness. The coefficient on the log of reference income is negative. This result proposes that higher reference income results in a significant negative influence on happiness in Ireland. The marginal effects in Table 4.2.1(a) show that an increase in reference income decreases the probability of reporting oneself as "very happy" by 7.2%. Model 1 reference income findings are however, non-statistically significant.

Table 4.2.1 Model 2 examines the effect of reference income on life satisfaction. The log of reference income depicts a negative coefficient. This states that, in Ireland, higher reference income has a significant negative effect on life satisfaction. In Table 4.2.1(a) the marginal effects illustrate that increasing reference income reduces the probability of reporting the highest life satisfaction level by 3.5 percentage points. Model 2 reference income findings are however, non-statistically significant.

The above reference income coefficient results for Ireland are in accordance with previous economic findings, namely that an increase in reference group income results in a reduction in individual well-being. Few economic empirical analyses, when focusing on well-being and income, account for reference group income. Studies which do include Clark and Oswald (1996), Kapteyn *et al.*, (1997), Van de Stadt *et al.*, (1985), McBride (2001) and Ferrer-i-Carbonell (2005). These studies all report reference group income as having a negative effect on individual well-being.

[4.2.1] Model 1 is an ordered probit regression estimating the happiness-reference-income gradient for all Irish citizens where several standard demographic and individual control variables are included.
Model 2 is an ordered probit regression estimating the life-satisfaction-reference-income gradient for all Irish citizens where several standard demographic and individual control variables are included.

Table 4.2.1: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Reference Group Income Being the Primary Independent Variable

Variable Name	Happiness Coefficient (β) and Z-Stat (1)	Life Satisfaction Coefficient (β) and Z-Stat (2)
In(ReferenceIncom)	-0.185 (-1.33)	-0.193 (-1.59)
In(Absoluteincome)	0.268*** (2.66)	0.436*** (4.95)
Relvimp	0.274** (2.06)	0.014 (0.12)
Relnimp	-0.056 (-0.41)	-0.086 (-0.72)
Relnalimp	-0.345* (-1.9)	-0.135 (-0.84)
Healthgood	-0.442*** (-3.77)	-0.235** (-2.32)
Healthfair	-0.645*** (-3.91)	-0.599*** (-4.13)
Healthpoor	-1.752*** (-5.76)	-1.378*** (-5.08)
Healthvpoor	-0.486 (-0.8)	-0.630 (-1.19)
Jobdissatied	0.764 (0.61)	-0.716 (-0.67)
Jobsatisfied2	-0.006 (-0.01)	-0.024 (-0.03)
Jobsatisfied4	-0.788* (-1.77)	-1.009** (-2.58)
Jobsatisfied5	0.495 (1.12)	-1.071*** (-2.89)
Jobsatisfied6	-0.280 (-0.81)	-1.008*** (-3.33)
Jobsatisfied7	-0.246 (-1.18)	-0.546*** (-3.01)
Jobsatisfied8	-0.346* (-1.85)	-0.422*** (-2.6)
Jobsatisfied9	0.207 (1.03)	-0.180 (-1.06)
Male	0.015 (0.13)	-0.096 (-0.92)
EmpL30	-0.061 (-0.31)	0.166 (0.96)
EmpSelf	-0.130 (-0.52)	-0.011 (-0.05)
EmpRetired	-0.058 (-0.25)	-0.218 (-1.06)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 4.2.1 continued: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Reference Group Income Being the Primary Independent Variable

Variable Name	Happiness Coefficient (β) and Z-Stat (1)	Life Satisfaction Coefficient (β) and Z-Stat (2)
EmpHousewife	-0.121 (-0.65)	-0.283* (-1.73)
EmpStudent	0.405 (0.85)	-0.835** (-2.06)
EmpUnemploye	-0.412* (-1.76)	-0.539*** (-2.62)
EmpDisability	-0.271 (-0.58)	-0.749* (-1.78)
EmpOther	0.017 (0.03)	0.615 (1.1)
Age17to25	-0.510** (-2.53)	-0.206 (-1.18)
Age36to45	-0.473*** (-2.96)	-0.265* (-1.94)
Age46to55	-0.326* (-1.9)	-0.206 (-1.41)
Age56to65	-0.480** (-2.45)	-0.080 (-0.47)
Age66to75	-0.285 (-1.17)	0.086 (0.41)
Age76plus	-0.424 (-1.53)	0.222 (0.91)
SouthWest	-0.130 (-0.79)	0.230 (1.62)
SouthEast	-0.070 (-0.4)	0.552*** (3.57)
MidWest	-0.295 (-1.56)	0.488*** (2.91)
MidEast	0.258 (1.07)	0.479** (2.37)
West	-0.364** (-1.98)	0.233 (1.44)
Midland	-0.155 (-0.82)	0.025 (0.15)
Border	-0.391* (-1.83)	-0.001 (0)
Model Summary		
Observations	579	580
LR chi2	109.72	160.46
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1048	0.0754
Log likelihood	-468.67039	-983.78626

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 4.2.1(a): Marginal Effects of the Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Reference Group Income Being the Primary Independent Variable

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
In(ReferenceIncom)	-0.072 (-1.33)	-0.035 (-1.58)
In(Absoluteincome)	0.105*** (2.66)	0.078*** (4.66)
Relvimp	0.107** (2.05)	0.003 (0.12)
Relnimp	-0.022 (-0.41)	-0.015 (-0.74)
Relnalimp	-0.129** (-2.02)	-0.023 (-0.91)
Healthgood	-0.169*** (-3.88)	-0.041** (-2.36)
Healthfair	-0.230*** (-4.46)	-0.082*** (-5.09)
Healthpoor	-0.410*** (-14.47)	-0.107*** (-8.13)
Healthvpoor	-0.174 (-0.91)	-0.075** (-2.03)
Jobdissatied	0.294 (0.69)	-0.080 (-1.3)
Jobsatisfied2	-0.002 (-0.01)	-0.004 (-0.03)
Jobsatisfied4	-0.259** (-2.35)	-0.094*** (-5.68)
Jobsatisfied5	0.195 (1.15)	-0.096*** (-6.33)
Jobsatisfied6	-0.105 (-0.86)	-0.096*** (-6.42)
Jobsatisfied7	-0.093 (-1.22)	-0.074*** (-3.99)
Jobsatisfied8	-0.129* (-1.95)	-0.062*** (-3.16)
Jobsatisfied9	0.082 (1.02)	-0.030 (-1.16)
Male	0.006 (0.13)	-0.017 (-0.93)
EmpL30	-0.024 (-0.31)	0.032 (0.88)
EmpSelf	-0.050 (-0.53)	-0.002 (-0.05)
EmpRetired	-0.023 (0.25)	-0.036 (-1.17)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 4.2.1(a) continued: Marginal Effects of the Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Reference Group Income Being the Primary Independent Variable

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
EmpHousewife	-0.047 (-0.65)	-0.046* (-1.94)
EmpStudent	0.160 (0.86)	-0.087*** (-4.14)
EmpUnemploye	-0.151* (-1.92)	-0.072*** (-3.6)
EmpDisability	-0.101 (-0.61)	-0.083*** (-3.34)
EmpOther	0.007 (0.03)	0.155 (0.86)
Age17to25	-0.185*** (-2.82)	-0.033 (-1.32)
Age36to45	-0.176*** (-3.17)	-0.043** (-2.13)
Age46to55	-0.123** (-1.99)	-0.034 (-1.53)
Age56to65	-0.176*** (-2.67)	-0.014 (-0.49)
Age66to75	-0.108 (-1.22)	0.016 (0.4)
Age76plus	-0.155* (-1.67)	0.045 (0.82)
SouthWest	-0.050 (-0.8)	0.046 (1.47)
SouthEast	-0.027 (-0.4)	0.127*** (2.91)
MidWest	-0.111 (-1.63)	0.110** (2.4)
MidEast	0.102 (1.07)	0.110* (1.94)
West	-0.136** (-2.1)	0.047 (1.29)
Midland	-0.060 (-0.84)	0.005 (0.15)
Border	-0.144** (-1.97)	0.000 (0)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Relative Income

Table 4.2.2 tests the third hypothesis by estimating the effect of relative income on individual well-being using an ordered probit model. In Model 1 happiness is the dependent variable. Whereas, life satisfaction is the dependent variable in Model 2[4.2.2]. Model 1 and Model 2 including the following independent variables: relative income, absolute income, religion, health, job satisfaction, gender, employment, age and region of residence.

Model 1 in Table 4.2.2 estimates the effect of relative income on happiness. The coefficient on the log of relative income is positive which suggests that the richer a particular individual is compared to his/her reference group the higher happiness that individual will possess. The marginal effects results in Table 4.2.2(a) depict that rising relative income increases the probability by 0.1 percentage points of stating the highest happiness level. The relative income results for Model 1 are however, non-statistically significant.

Model 2 in Table 4.2.2 measures the effect of relative income on life satisfaction. A positive coefficient on the log of relative income is found. Hence, results report that in Ireland the wealthier a specific person is compared to his/her reference group the greater life satisfaction that individual will report. In Table 4.2.2(a) the marginal effects illustrate that increasing relative income raises the probability of reporting a life satisfaction level of 10 by 0.1%. The relative income results for Model 2 are however, non-statistically significant.

These relative income results for Ireland are in accordance with previous economic findings (Easterlin, 1995; Dynan & Ravina, 2007; Ferrer-i-Carbonell, 2005). Therefore, these findings state that Irish resident's well-being depends not only on absolute income but also on relative income.

[4.2.2] Model 1 is an ordered probit regression estimating the happiness-relative-income gradient for all Irish citizens where several standard demographic and individual control variables are included.
Model 2 is an ordered probit regression estimating the life-satisfaction-relative-income gradient for all Irish citizens where several standard demographic and individual control variables are included.

Table 4.2.2: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Relative Income Being the Primary Independent Variable

Variable Name	Happiness Coefficient (β) and Z-Stat (1)	Life Satisfaction Coefficient (β) and Z-Stat (2)
In(RelativeIncome)	0.001 (1.54)	0.001 (0.36)
In(Absoluteincome)	0.097 (0.96)	0.333*** (3.75)
Relvimp	0.288** (2.16)	0.017 (0.15)
Relnimp	-0.046 (-0.33)	-0.084 (-0.7)
Relnalimp	-0.334* (-1.84)	-0.138 (-0.86)
Healthgood	-0.444*** (-3.79)	-0.228** (-2.25)
Healthfair	-0.636*** (-3.86)	-0.585*** (-4.04)
Healthpoor	-1.755*** (-5.78)	-1.391*** (-5.12)
Healthvpoor	-0.488 (-0.8)	-0.627 (-1.18)
Jobdissatied	0.767 (0.62)	-0.730 (-0.68)
Jobsatisfied2	-0.025 (-0.03)	-0.031 (-0.04)
Jobsatisfied4	-0.783* (-1.75)	-0.996** (-2.54)
Jobsatisfied5	0.510 (1.15)	-1.091*** (-2.95)
Jobsatisfied6	-0.286 (-0.83)	-1.011*** (-3.34)
Jobsatisfied7	-0.258 (-1.24)	-0.556*** (-3.07)
Jobsatisfied8	-0.356* (-1.9)	-0.421** (-2.59)
Jobsatisfied9	0.195 (0.97)	-0.191 (-1.12)
Male	0.030 (0.25)	-0.100 (-0.95)
EmpL30	-0.057 (-0.29)	0.174 (1.01)
EmpSelf	-0.118 (-0.47)	-0.011 (-0.05)
EmpRetired	-0.069 (-0.29)	-0.218 (-1.06)
EmpHousewife	-0.116 (-0.62)	-0.281* (-1.72)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 4.2.2 continued: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Relative Income Being the Primary Independent Variable

Variable Name	Happiness Coefficient (β) and Z-Stat (1)	Life Satisfaction Coefficient (β) and Z-Stat (2)
EmpStudent	0.374 (0.78)	-0.868** (-2.14)
EmpUnemploye	-0.430* (-1.83)	-0.535** (-2.59)
EmpDisability	-0.286 (-0.61)	-0.717* (-1.7)
EmpOther	0.023 (0.04)	0.648 (1.16)
Age17to25	-0.505** (-2.51)	-0.190 (-1.09)
Age36to45	-0.471*** (-2.95)	-0.260* (-1.9)
Age46to55	-0.324* (-1.89)	-0.203 (-1.38)
Age56to65	-0.484** (-2.47)	-0.048 (-0.28)
Age66to75	-0.265 (-1.11)	0.164 (0.8)
Age76plus	-0.397 (-1.47)	0.318 (1.34)
SouthWest	-0.120 (-0.73)	0.235 (1.65)
SouthEast	-0.065 (-0.37)	0.558*** (3.61)
MidWest	-0.277 (-1.47)	0.505*** (3.02)
MidEast	0.278 (1.16)	0.494** (2.45)
West	-0.345* (-1.88)	0.263 (1.64)
Midland	-0.133 (-0.71)	0.044 (0.28)
Border	-0.364* (-1.72)	0.037 (0.2)
Model Summary		
Observations	579	580
LR chi2	110.32	158.05
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1054	0.0743
Log likelihood	-468.36594	-984.99148

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied) Significance levels: ***1%, **5%, *10%)*

Table 4.2.2(a): Marginal Effects of the Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Relative Income Being the Primary Independent Variable

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
ln(RelativeIncome)	0.001 (1.54)	0.001 (0.36)
ln(Absoluteincome)	0.038 (0.96)	0.060*** (3.75)
Relvimp	0.113** (2.15)	0.003 (0.15)
Relnimp	-0.018 (-0.33)	-0.015 (-0.72)
Relnalimp	-0.125* (-1.94)	-0.023 (-0.92)
Healthgood	-0.170*** (-3.89)	-0.040** (-2.29)
Healthfair	-0.227*** (-4.39)	-0.081*** (-4.97)
Healthpoor	-0.410*** (-14.51)	-0.108*** (-8.16)
Healthvpoor	-0.174 (-0.91)	-0.075** (-2.02)
Jobdissatied	0.295 (0.69)	-0.081 (-1.35)
Jobsatisfied2	-0.010 (-0.03)	-0.005 (-0.04)
Jobsatisfied4	-0.258** (-2.33)	-0.094*** (-5.57)
Jobsatisfied5	0.201 (1.18)	-0.097*** (-6.47)
Jobsatisfied6	-0.107 (-0.87)	-0.096*** (-6.45)
Jobsatisfied7	-0.097 (-1.29)	-0.075*** (-4.08)
Jobsatisfied8	-0.133** (-2.01)	-0.062*** (-3.15)
Jobsatisfied9	0.077 (0.96)	-0.031 (-1.24)
Male	0.012 (0.25)	-0.018 (-0.96)
EmpL30	-0.022 (-0.29)	0.034 (0.93)
EmpSelf	-0.045 (-0.47)	-0.002 (-0.05)
EmpRetired	-0.027 (-0.3)	-0.036 (-1.17)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 4.2.2(a) continued: Marginal Effects of the Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Relative Income Being the Primary Independent Variable

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
EmpHousewife	-0.045 (-0.63)	-0.045* (-1.92)
EmpStudent	0.148 (0.78)	-0.089*** (-4.41)
EmpUnemploye	-0.157** (-2)	-0.071*** (-3.56)
EmpDisability	-0.107 (-0.64)	-0.081*** (-3.1)
EmpOther	0.009 (0.04)	0.166 (0.9)
Age17to25	-0.183*** (-2.79)	-0.031 (-1.21)
Age36to45	-0.175*** (-3.15)	-0.043** (-2.08)
Age46to55	-0.122** (-1.97)	-0.034 (-1.51)
Age56to65	-0.177*** (-2.7)	-0.008 (-0.29)
Age66to75	-0.100 (-1.16)	0.032 (0.74)
Age76plus	-0.146 (-1.59)	0.067 (1.15)
SouthWest	-0.046 (-0.74)	0.047 (1.5)
SouthEast	-0.025 (-0.37)	0.129*** (2.94)
MidWest	-0.105 (-1.53)	0.115** (2.48)
MidEast	0.110 (1.15)	0.115** (1.99)
West	-0.129** (-2)	0.054 (1.45)
Midland	-0.051 (-0.72)	0.008 (0.27)
Border	-0.135* (-1.84)	0.007 (0.2)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

4.3: Discussion of Additional Explanatory Variable Results

The coefficients of the additional explanatory variables, in Table 4.2, Table 4.2.1 and Table 4.2.2, do not present much variation from previous literature. What follows is a discussion of results from the additional explanatory variables.

Health

Health is found to have a positive effect on well-being. The coefficient results for "health good", "health fair" and "health poor" are all negative and statistically significant at the 1% or 5% level. This illustrates that individuals who report their health as being "very good" possess greater well-being than individuals who report their health as being "good", "fair" or "poor". These findings are in accordance with Lelkes (2006a), Gerdtham and Johannesson (2001), Clark and Oswald (1994) and Dolan *et al.*, (2008) who all report a significant positive relationship between well-being and health.

Findings show that the less healthy individuals report themselves as being, the more negative the effect which health has on well-being. This is consistent with Easterlin (2003) when finding that an averse change in health reduces life satisfaction and the worse the change in health the greater the reduction in life satisfaction. The marginal effects in Table 4.2(a) Model 1 illustrate that reporting "good" health, instead of "very good", reduces the probability of reporting oneself as "very happy" by 16.6%. The probability of reporting oneself as "very happy" falls by 22.5% if one claims a health level of "fair" and by 41.1% if "poor health" is reported. Likewise, Table 4.2(a) Model 2 illustrates that reporting ones health as "good", instead of "very good", decreases the probability of reporting a life satisfaction level of 10 by 4%. The probability of reporting a life satisfaction level of 10 falls to 8.1% if one reports a health level of "fair" and to 10.8% if "poor" health is reported. These results are similar to the findings in Table 4.2.1(a) when reference income is controlled for and the results in Table 4.2.2(a) which controls for relative income.

This chapter finds that the negative effect, on happiness, of not reporting ones health as "very good" is larger than the negative effect of being unemployed. Indeed, when analysing all of the control variables, reporting ones health as "poor" impacts

happiness to the greatest extent. This is consistent with Helliwell (2003) and Borooah (2006) who find that the self-assessed health variable is the most significant of all the included variables when explaining well-being. Helliwell (2003) finds that an improvement in health of one-point (on a five-point scale) results in a 0.61 point increase in subjective well-being. Borooah (2006) finds that an improvement in health is predicted to increase the probability of being in the highest happiness category by 15.3 percentage points.

As stated reporting ones health as "poor" is the most important of all the included variables when explaining well-being. An explanation for this is that individuals who report this health status may fear that they are approaching the end of life. Thus, individuals who report their health as "poor" either already know or expect a poor prognoses on subsequent mortality. Subjective measures of health status are found to be useful when predicting succeeding mortality (van Doorslaer & Koolman, 2004; Idler & Benyamini, 1997). Hamermesh (2004) clarifies that self-assessed measures of health status are used by analysts as it is nearly impossible to take blood samples or measure heart rates and cholesterol levels when collecting data for large scale surveys. The self-assessed health variable offers an ordered ranking and may be altered into a dichotomous variable; one category containing those with good health and the other category comprising individuals with less than good health (Borgonovi, 2008).

Job Satisfaction

Results report a positive relationship between well-being and job satisfaction. Respondents were asked to rank their levels of job satisfaction on a scale of 1 to 10, where 1 = dissatisfied and 10 = satisfied. In Table 4.2, Table 4.2.1 and Table 4.2.2 eight dummy variables for job satisfaction are included in Model 1 and Model 2. Jobsatisfied3 is omitted due to no individual in the Irish 2008 EVS reporting a job satisfaction level of 3. The parameter estimates are relative to the base case, in this case Jobsatisfied10. In this discussion Model 2 results will be concentrated on as more statistically significant results are found in this Model.

In Table 4.2, Table 4.2.1 and Table 4.2.2 the job satisfaction coefficients on life satisfaction (excluding the non-statistically significant results of Job satisfied 1, Job satisfied 2 and Job satisfied 9) are negative and statistically significant. Thus,

individuals who state that they possess a job satisfaction level of 4,5,6,7 and 8 report lower levels of life satisfaction than individuals who possess a job satisfaction level of 10. This finding suggests that higher job satisfaction results in higher well-being. Indeed Table 4.2(a), Table 4.2.1(a) and 4.2.2(a) find a consistent reduction in the probability of reporting the highest well-being level as one reduces job satisfaction levels. One exception exists: namely "Jobsatisfied4" in Model 2 where respondents in this job satisfaction category report a lower negative effect on life satisfaction than individuals who clam a job satisfaction level of 5.

Unemployment

The unemployment coefficients in Table 4.2, Table 4.2.1 and Table 4.2.2 are negative and statistically significant in both Model 1 and Model 2. This illustrates the negative relationship between well-being and joblessness. This result is relative to the base case, of being in paid employment of 30 hours a week or more, while holding the other variables in the model constant. The finding of a negative well-being-unemployment relationship is consistent with previous literature such as Stutzer (2004), Di Tella *et al*., (2001), Frey and Stutzer (2000a), Clark and Oswald (1994) and Helliwell (2003).

The marginal effects in Table 4.2(a) Model 1 show that being unemployed decreases the probability of reporting oneself as "very happy" by 15%. In Model 2 results depict that joblessness reduces the probability by 7.1 percentage points of stating the highest life satisfaction level. Table 4.2.1(a) and Table 4.2.2(a) describe comparable findings.

It is interesting to note that this chapters results depict that not reporting a health status of "very good" (thus, subjective health being "good", "fair" or "poor") has a larger negative effect on happiness than being unemployed. In Model 2 not reporting a health status of "very good" or "good" (thus, subjective health being "fair" or "poor") has a larger negative effect on life satisfaction than being unemployed. This is in conflict with Winkelmann and Winkelmann (1998) finding that the effect of unemployment is almost three times larger than the effect of bad health on life satisfaction.

Disability

A negative relationship between well-being and disability is depicted. The EmpDisability (respondent has no paid employment resulting from disability) coefficients in Model 2 in Table 4.2, Table 4.2.1 and Table 4.2.2 are negative and

statistically significant. This illustrates the negative relationship between life satisfaction and being disabled. This result is in comparison to individuals who are in paid employment of 30 hours a week or more. This negative relationship between well-being and disability is consistent with previous literature such as Oswald and Powdthavee (2008).

The marginal effects in Table 4.2(a) Model 2 show that being disabled decreases the probability of reporting a life satisfaction level of 10 by 8%. In Table 4.2.1(a) Model 2 the marginal effects illustrate that disability decreases the probability of reporting the highest life satisfaction category by 8.3 percentage points. In Table 4.2.2(a) Model 2 the marginal effects illustrate that being disabled lowers the probability of reporting a life satisfaction level of 10 by 8.1%.

Being a Student

A statistically significant negative EmpStudent (respondent has no paid employment resulting from being a student) coefficient is found in Model 2 in Table 4.2, Table 4.2.1 and Table 4.2.2. These results indicate a negative association between life satisfaction and being a student.

The marginal effects in Table 4.2(a) Model 2 show that being a student decreases the probability of reporting a life satisfaction level of 10 by 8.9%. In Table 4.2.1(a) Model 2 the marginal effects illustrate that being a student decreases the probability of reporting the highest life satisfaction category by 8.7 percentage points. In Table 4.2.2(a) Model 2 the marginal effects depict that being a student lowers the probability of reporting a life satisfaction level of 10 by 8.9%.

It is noteworthy that the negative effect of being a student on life satisfaction is larger than the negative effect of being disabled on life satisfaction. This may result as individuals may somewhat adapt to disability. Oswald and Powdthavee (2008) depict that individuals adapt slightly to disability status. The fixed effects model in Oswald and Powdthavee (2008) finds that disability reduces life satisfaction (on a 1–7 scale) by 0.596 points for those with no past disability, by 0.521 points after 1 year of disability, 0.447 points after 2 years and 0.372 after 3 years of being disabled. Similarly, Silver (1982) also presents evidence that those who suffered spinal cord

injuries are tremendously unhappy immediately after the injury. However, they rapidly start to adapt to their new disability and within eight weeks positive emotions start to surpass negative emotions.

Being a Housewife

The coefficient on the housewife variable "EmpHousewife" (respondent has no paid employment resulting from being a housewife) in Model 2 in Table 4.2, Table 4.2.1 and Table 4.2.2 is negative and statistically significant. These coefficients illustrate a negative relationship between life satisfaction and being a housewife. This result is in comparison to individuals who are in paid employment of 30 hours a week or more. In Table 4.2(a) Model 2 the marginal effects illustrates that being a housewife decreases the probability of reporting the highest life satisfaction category by 4.6 percentage points. Table 4.2.1(a) and Table 4.2.2(a) Model 2 depict consistent results.

This negative relationship is in contradiction to Blanchflower and Oswald (2000) finding of an overall positive housewife coefficient of .0486. However, when dividing the population into three groups of individuals (under 20, under 30 and over 30) only those who are over 30 report a positive relationship between life satisfaction and being a housewife (Blanchflower & Oswald, 2000). Thus, housewives who are under the age of 20 or under the age of 30 *ceteris paribus* report lover levels of life satisfaction.

Area of Residence

Where one resides is shown to be significant in terms of ones well-being. The variable describing area of residence identifies a negative relationship between life satisfaction and living in the Dublin area. This is revealed by the positive statistically significant life satisfaction coefficient for individuals living in the south east, mid-west, mid-east and west in Table 4.2, Table 4.2.1 and Table 4.2.2.

This is consistent with evidence from economic studies including Dockery (2003), Gerdtham and Johannesson (2001) and Graham and Felton (2006) who all find that living in large cities is harmful, and that living in rural areas is beneficial, to well-being.

Religion

The explanatory variable describing how important religion is in people's lives illustrates a positive relationship between happiness and religion. Here the parameter estimates are compared to the base case, individuals who report religion as being "quite important". Those who report religion as "very important" report the highest happiness levels *ceteris paribus.* This is confirmed by the positive statistically significant happiness coefficient on "Relvimp".

The marginal effects in Table 4.2(a) Model 1 show that reporting religion as "very important" increases the probability of being "very happy" by 10.6%. Individuals who state religion as "not at all important" in their lives are 13.1 percentage points less likely to be "very happy". In Table 4.2.1(a) Model 1 the marginal effects illustrate that reporting religion as "very important" increases the probability of reporting the highest happiness category by 10.7 percentage points. Individuals who state religion as "not at all important" are 12.9 percentage points less likely to be "very happy". In Table 4.2.2(a) Model 1 the marginal effects depict that if religion is "very important" in one's life this increases the probability of reporting a happiness level of 4 by 11.3%. Individuals who state religion as "not at all important" in their lives are 12.5 percentage points less likely to be "very happy".

These results indicate a clear positive relationship between well-being and religion. This is consistent with Economic literature which primarily reveals that belief's affect individual well-being. Religious individuals (irrespective of faith) possess greater well-being than non-believers (Clark & Lelkes, 2005). It has been found that the positive effect of religion on well-being results from both the comfort provided by religious beliefs and from the social networks obtained by regular participation in church activities. This is consistent with Helliwell (2003) findings where both the comfort and social network variables are positively related to overall life satisfaction. Individuals who report that God is very important in their lives report an average 0.34 higher life satisfaction measure (Helliwell, 2003). Other studies which find a positive well-being-religion relationship include Clark and Lelkes (2005), Helliwell and Putnam (2004) and Rehdanz and Maddison (2005).

Age

Previous findings report a u-shaped relationship between well-being and age where individuals of around 35-45 years old possess the lowest well-being levels (Clark & Oswald, 1994; Gerdtham & Johannesson, 2001; Winkelmann, 2005). Thus, well-being decreases until approximately 40 years of age after which an increase occurs. In this chapter the age coefficients in Table 4.2, Table 4.2.1 and Table 4.2.2 do not conform to this common u-shaped relationship. The following results focus on Model 1 (where happiness is the dependent variable), as this model provides more statistically significant age coefficients then Model 2 (where life satisfaction is the dependent variable). This chapter identifies individuals of between 26 and 35 years old as possessing the highest happiness when keeping all other variables constant. However, it must be noted that the coefficients on Age66to75 and Age76plus are insignificant and therefore are not interpreted here.

Findings in Table 4.2(a) Model 1 show that being in the age group of between 17 and 25 has the largest negative effect on happiness. Here individuals in this age group possess a 17.8 reduced probability of reporting themselves as "very happy". This is followed by respondents between 36 and 45 years old, who are 17.4% less likely to report the highest happiness level. The age group of between 46 and 55, suffer a 12.2% lower probability of reporting themselves as "very happy". This negative probability increases once again to 16.1% if one reports the age group of between 56 and 65. Results are highly comparable in Table 4.2.1(a) Model 1 when reference income is controlled for and in Table 4.2.2(a) Model 1 when relative income is controlled for.

As discussed the results of this chapter find no distinct pattern within the well-being-age relationship. This is consistent with Myers and Diener (1995) and Deiner *et al.*, (1999) who both find no age pattern in their study.

4.4: Difference Between Life Satisfaction and Happiness Results

Many studies, despite having two distinct meanings, use the term happiness and life satisfaction interchangeably (Gerdtham & Johannesson, 2001; Frey & Stutzer, 2000a; Ferrer-i-Carbonell, 2005). The fourth hypotheses of this chapter identifies whether the effect of income on well-being is affected by the different definitions of well-being. This thesis defines happiness and life satisfaction similar to the definitions used by Helliwell and Putnam (2004).

Life satisfaction data was derived from the following EVS question: "*How satisfied are you with your life?"* Interviewees ranked their responses on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). This refers to the overall cognitive evaluation of an individual's own life. Happiness data was derived from the EVS question which reads as follows: *"All things together how happy are you?*" Interviewees ranked their responses on an ordered scale, with the options of choosing "not at all happy", "not very happy", "quite happy" or "very happy". This refers to immediate positive or negative emotions experienced by an individual when considering all aspects of their life.

The subjective well-being data does not have a natural scale (Sacks *et al.*, 2010). The two well-being measures that are considered are life satisfaction measured on a 10-point scale and happiness measured on a four-point scale. Thus, a discrepancy in the scale occurs. In order to make the coefficients from survey linear estimation on the 10-point life satisfaction equation more easily comparable with those from the 4-point happiness equation Table 4.4 collapses the life satisfaction data into a 4-point scale.

Similar to that done in Kapferer *et al*., (2012) the measure of life satisfaction labelled as "very satisfied" includes all respondents who ranked their life satisfaction with scores of 9 or 10. Correspondingly those who report a life satisfaction score of 1 or 2 are stated as being "not at all satisfied". Life satisfaction 3, 4 and 5 are collapsed and categorised as "not very satisfied". Likewise, individuals who are "quite satisfied" are referred to as having a life satisfaction score of 6, 7 or 8. Table 4.4, using an ordered probit model, tests whether individual income results in a positive effect on individual well-being when happiness and life satisfaction are both measured on a 4-point scale.

When comparing the life satisfaction and happiness results this chapter finds specific variances within an overall context of significant similarity. It is identified that when responding to the life satisfaction question, individual's answers are reflective of their whole life experience including economic conditions. Whereas the happiness question prompts responses based on one's current circumstances or mood and are more reflective of non-economic factors.

Absolute income and unemployment are found to depict a stronger association with life satisfaction than with happiness. Indeed, the marginal effects in Table 4.4(a) Model 1 and Model 2 show that an increase in absolute income increases the probability of reporting oneself as "very happy" by 7.4% compared with the probability of 13.6% of reporting the highest life satisfaction category. Being unemployed decreases the probability of reporting oneself as "very happy" by 15 percentage points and the highest life satisfaction level by 16.1 percentage points. These findings illustrate that economic conditions have a larger effect on life satisfaction (a long term, more stable evaluation of one's life) then on happiness (a short term, situation dependent expression of mood).

However, non-economic conditions depict a larger effect on happiness then on life satisfaction. This is seen in the age and health coefficients which depict a stronger association with happiness then with life satisfaction. Findings in Table 4.4(a) Model 1 and Model 2 show that reporting "good" health, instead of "very good" health, reduces the probability of reporting oneself as "very happy" by 16.6%. Stating ones health as "good" lowers the likelihood of possessing the highest life satisfaction by 9.1%. The probability of reporting oneself as "very happy" falls to 41.1% if one claims a health level of "poor". Reporting ones health as "poor", instead of "very good", decreases the probability of reporting the greatest life satisfaction level by 33.4%.

Likewise individuals in this age group of between 36 and 45 possess a 17.4 reduced probability of reporting themselves as "very happy". This is compared to a 9.6 reduced probability of reporting the highest life satisfaction level.

The above results are consistent with Peiró (2006) who differentiates happiness and life satisfaction as two distinct spheres of well-being: happiness being independent of economic factors while life satisfaction is conditioned by them. These results indicate the importance of distinguishing between the two definitions of well-being.

Table 4.4: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Happiness and Life Satisfaction on a 4-Point Scale

Variable Name	Happiness Coefficient (β) and Z-Stat (1)	Life Satisfaction Coefficient (β) and Z-Stat (2)
In(Absoluteincome)	0.189** (2.33)	0.366*** (4.57)
Relvimp	0.271** (2.04)	0.014 (0.11)
Relnimp	-0.056 (-0.4)	-0.043 (-0.32)
Relnalimp	-0.350* (-1.93)	-0.188 (-1.04)
Healthgood	-0.433*** (-3.7)	-0.248** (-2.17)
Healthfair	-0.629*** (-3.83)	-0.525*** (-3.25)
Healthpoor	-1.769*** (-5.83)	-1.465*** (-4.95)
Healthvpoor	-0.481 (-0.79)	-0.383 (-0.64)
Jobdissatied	0.745 (0.6)	-0.856 (-0.76)
Jobsatisfied2	-0.019 (-0.02)	-0.590 (-0.68)
Jobsatisfied4	-0.775* (-1.74)	-1.060** (-2.46)
Jobsatisfied5	0.461 (1.04)	-1.195*** (-2.94)
Jobsatisfied6	-0.287 (-0.83)	-0.936*** (-2.81)
Jobsatisfied7	-0.255 (-1.22)	-0.474** (-2.32)
Jobsatisfied8	-0.341* (-1.83)	-0.355* (-1.93)
Jobsatisfied9	0.196 (0.98)	-0.055 (-0.28)
Male	0.005 (0.04)	-0.118 (-1.01)
EmpL30	-0.054 (-0.27)	0.078 (0.4)
EmpSelf	-0.131 (-0.52)	-0.046 (-0.18)
EmpRetired	-0.061 (-0.26)	-0.192 (-0.82)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on a four point scale from 1 (dissatisfied) to 4 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 4.4 continued: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Happiness and Life Satisfaction on a 4-Point Scale

Variable Name	Happiness Coefficient (β) and Z-Stat (1)	Life Satisfaction Coefficient (β) and Z-Stat (2)
EmpHousewife	-0.120 (-0.64)	-0.242 (-1.31)
EmpStudent	0.378 (0.79)	-0.821* (-1.8)
EmpUnemploye	-0.407* (-1.74)	-0.485** (-2.11)
EmpDisability	-0.233 (-0.5)	-0.679 (-1.49)
EmpOther	0.054 (0.09)	0.889 (1.24)
Age17to25	-0.491** (-2.45)	-0.255 (-1.3)
Age36to45	-0.468*** (-2.94)	-0.267* (-1.73)
Age46to55	-0.323* (-1.89)	-0.222 (-1.34)
Age56to65	-0.438** (-2.27)	-0.034 (-0.18)
Age66to75	-0.192 (-0.83)	0.244 (1.06)
Age76plus	-0.312 (-1.18)	0.385 (1.45)
SouthWest	-0.130 (-0.79)	0.215 (1.35)
SouthEast	-0.065 (-0.37)	0.607*** (3.42)
MidWest	-0.278 (-1.48)	0.496*** (2.63)
MidEast	0.269 (1.12)	0.342 (1.5)
West	-0.333* (-1.82)	0.345* (1.89)
Midland	-0.137 (-0.73)	0.109 (0.6)
Border	-0.354* (-1.67)	0.049 (0.24)
Model Summary		
Observations	579	580
LR chi2	107.95	134.31
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1031	0.1182
Log likelihood	-469.55324	-500.82827

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on a four point scale from 1 (dissatisfied) to 4 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 4.4(a): Marginal Effects of the Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Happiness and Life Satisfaction on a 4-Point Scale

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
In(Absoluteincome)	0.074** (2.33)	0.136*** (4.58)
Relvimp	0.106** (2.03)	0.005 (0.11)
Relnimp	-0.022 (-0.41)	-0.016 (-0.32)
Relnalimp	-0.131** (-2.05)	-0.067 (-1.08)
Healthgood	-0.166*** (-3.8)	-0.091** (-2.2)
Healthfair	-0.225*** (-4.35)	-0.177*** (-3.68)
Healthpoor	-0.411*** (-14.73)	-0.334*** (-10.97)
Healthvpoor	-0.172 (-0.9)	-0.130 (-0.72)
Jobdissatied	0.287 (0.67)	-0.244 (-1.17)
Jobsatisfied2	-0.007 (-0.02)	-0.186 (-0.86)
Jobsatisfied4	-0.256** (-2.3)	-0.280*** (-4.35)
Jobsatisfied5	0.182 (1.06)	-0.299*** (-5.82)
Jobsatisfied6	-0.107 (-0.88)	-0.262*** (-4.39)
Jobsatisfied7	-0.096 (-1.27)	-0.160*** (-2.63)
Jobsatisfied8	-0.128* (-1.92)	-0.124** (-2.08)
Jobsatisfied9	0.077 (0.97)	-0.020 (-0.29)
Male	0.002 (0.04)	-0.043 (-1.01)
EmpL30	-0.021 (-0.27)	0.029 (0.4)
EmpSelf	-0.050 (-0.53)	-0.017 (-0.19)
EmpRetired	-0.024 (-0.26)	-0.069 (-0.85)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on a four point scale from 1 (dissatisfied) to 4 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 4.4(a) continued: Marginal Effects of the Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Happiness and Life Satisfaction on a 4-Point Scale

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
EmpHousewife	-0.047 (-0.65)	-0.087 (-1.36)
EmpStudent	0.150 (0.8)	-0.239*** (-2.62)
EmpUnemploye	-0.150* (-1.89)	-0.161** (-2.43)
EmpDisability	-0.088 (-0.52)	-0.208** (-1.98)
EmpOther	0.021 (0.09)	0.343 (1.36)
Age17to25	-0.178*** (-2.7)	-0.090 (-1.37)
Age36to45	-0.174*** (-3.14)	-0.096* (-1.8)
Age46to55	-0.122** (-1.97)	-0.080 (-1.39)
Age56to65	-0.161** (-2.44)	-0.013 (-0.18)
Age66to75	-0.074 (-0.85)	0.093 (1.04)
Age76plus	-0.117 (-1.25)	0.149 (1.42)
SouthWest	-0.050 (-0.8)	0.082 (1.32)
SouthEast	-0.025 (-0.37)	0.236*** (3.4)
MidWest	-0.105 (-1.54)	0.193** (2.59)
MidEast	0.107 (1.12)	0.132 (1.47)
West	-0.125* (-1.93)	0.133* (1.85)
Midland	-0.053 (-0.74)	0.041 (0.59)
Border	-0.131* (-1.78)	0.018 (0.24)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on a four point scale from 1 (dissatisfied) to 4 (satisfied). Significance levels: ***1%, **5%, *10%)*

4.5: Post Estimation Diagnostics

The Likelihood Ratio Chi-Square (LR chi2) tests that at least one of the predictor's regression coefficient is not equal to zero (Syafitri, 2013). The likelihood ratio chi-square, for all regressions in this chapter, are between 107.95 and 160.46. All regressions have a Prob > chi2 (p-value) of 0.00. These results indicate that the models used in this chapter are statistically significant at the 99% confidence interval. For OLS and probit estimations, Pseudo R-squared may be used when measuring the strength of the association between the dependent and predictor variables (Syafitri, 2013). The pseudo-R^2 for the eight regressions in this chapter are between 0.0742 and 0.1182. This is roughly consistent with previous literature which states that between eight and twenty percent of individual well-being results from objective variables and therefore may be explicated (Kahneman *et al.,* 1999).

A Wald test is performed on the cut-off points displayed in Table A4.2, Table A4.2.1, Table A4.2.2 and A4.4 in the appendix. The Wald Test is used to test the joint significance of a subset of coefficients. For all regressions in this chapter the null hypothesis that the cut-offs are jointly equal to zero is rejected at the 1% significance level.

4.6: Chapter Conclusion

This chapter tests whether the effect of relative and reference income on well-being partially explains the seemingly opposing results of the Easterlin paradox. This chapter presents an empirical analysis of the importance of absolute, reference and relative income on individual well-being in Ireland. Irish data from the 2008 EVS is employed. EVS responses to a life satisfaction and happiness question are used in order to assess well-being levels.

Table 4.2, using an ordered probit model, estimates the effects of annual absolute household income, and a set of control variables, on individual happiness and life satisfaction. Results indicate that individuals living in Ireland significantly care about their absolute level of income. The absolute income coefficients in the two Models in Table 4.2 are statistically significant and positive, demonstrating that higher household income results in higher subjective well-being. These results for Ireland are in accordance with previous economic findings: namely that richer individuals in a particular nation, *ceteris paribus*, report higher levels of well-being than fellow-citizens at the bottom of the income distribution (Easterlin, 1974; Frey & Stutzer, 2000a). This absolute income finding is consistent with the Easterlin paradox.

Table 4.2.1 tests the effect of reference income and a set of control variables on individual happiness and life satisfaction using an ordered probit model. A negative reference income coefficient for both happiness and life satisfaction is identified in Model 1 and Model 2. Therefore, this chapter identifies that, in Ireland, an increase in reference group income results in a reduction in individual well-being.

Table 4.2.2 approximates the effect of relative income and a set of control variables on individual happiness and life satisfaction using an ordered probit model. A positive relative income coefficient for both happiness and life satisfaction is found in Model 1 and Model 2. Consequently, this chapter finds that the richer a particular Irish resident is compared to his/her reference group the higher subjective well-being that individual will possess.

Additional explanatory variable coefficients, in Table 4.2, Table 4.2.1 and Table 4.2.2, do not present much discrepancy from past economic literature. Being unemployed lowers well-being. Higher job satisfaction and good health grants greater well-being. There is a non-linear well-being effect of age. The well-being-age effect appears not to conform to the common u-shaped relationship. This chapter identifies individuals of between 26 and 35 years old as possessing higher happiness levels than individuals between the age of 17 and 25 or 36 and 65. Results demonstrate that being a housewife, student or disabled reduces life satisfaction. A negative relationship between life satisfaction and living in the Dublin area is identified. Lastly, the more religious an individual is the higher their reported well-being levels.

When comparing the life satisfaction and happiness results, this chapter identifies specific variances within an overall context of significant similarity. This chapter finds that when responding to the life satisfaction question, individual's answers are reflective of their whole life experience including economic conditions. Whereas the happiness question prompts responses based on one's current circumstances or mood and are more reflective of non-economic factors. This chapter indicates the importance of distinguishing between the two definitions of well-being. Those empirical studies who fail to do so may be obtaining incomplete results.

This thesis is motivated to understand the Easterlin paradox. This chapter's findings confirm the important role of absolute income when determining well-being in Ireland. Happiness is considered as an ultimate goal of life (Frey & Stutzer, 2002a). Therefore, this thesis suggests government policy to continue their focus on economic growth thereby increasing absolute levels of household income in Ireland.

This chapter's positive relative income and negative reference income coefficient for well-being suggests that individuals are also concerned with their income relative to the incomes of their peer group. Therefore, this chapter confirms the importance of peer group income on well-being as a potential clarification of the seemingly conflicting Easterlin (1974) findings.

In order to achieve a maximisation of aggregate well-being in Ireland this chapter suggests government policy to account for the effects of absolute as well as peer group

income on individual well-being. Results of this thesis highlight the importance of evaluating aggregate well-being levels instead of individual well-being levels when determining policy decisions. If governments encourage an increase in household income, without concern for the importance of relative income on well-being, predicted increases in well-being may be less than expected.

CHAPTER 5

EXAMINATION OF THE EXISTENCE OF A PARTICULAR INCOME LEVEL BEYOND WHICH A CHANGE IN THE WELL-BEING-INCOME RELATIONSHIP OCCURS IN EUROPE

The aim of this thesis is to explore the possible explanations of the apparent contradictory results provided by Easterlin (1974), by using cross sectional data of European residents obtained from the 2008 wave of the EVS. Easterlin (1974) pioneered the economics of well-being in the 1970s and finds that although average reported well-being levels reveal significant differences within countries, they do not have a strong correlation with average levels of national income. The aim of this thesis is achieved by estimating the well-being-income relationship in many different ways.

This chapter, in order to explore the accuracy and possible explanations of the inconsistent findings provided by Easterlin (1974), presents an empirical analysis of the existence of a particular income level beyond which a change in the well-being-income relationship occurs. Stevenson and Wolfers (2013: 598) state that this income threshold level may be referred to as a "*satiation point*". Stevenson and Wolfers (2013: 598) also claim that the hypothesis, that a positive well-being-income relationship prevails only for low income nations and individuals, may be referred to as the "*modified Easterlin hypothesis*". This thesis adopts Stevenson and Wolfers's (2013) interpretation of the modified Easterlin hypothesis and satiation point.

This chapter is comprised of seven sections. Section 5.1 discusses the empirical techniques. Section 5.2 describes the non-parametric fit of the well-being-income relationship. Section 5.3 presents the cross national evidence of a satiation point in the well-being-income relationship. Section 5.4 estimates the within nation evidence of a satiation point in the well-being-income relationship. Section 5.5 presents the difference between life satisfaction and happiness results. A discussion of results is offered in each section. Section 5.6 outlines the post estimation diagnostics. Section 5.7 concludes this chapter.

5.1: Empirical Techniques

The macroeconomic empirical work of this chapter presents an analysis of the existence of a particular income level beyond which a change in the well-being-GDP relationship occurs. This is achieved through the estimation of separate "rich nation" and "poor nation" ordered probit regressions. Two variations of the modified Easterlin hypothesis are examined; Firstly whether, beyond a particular threshold of basic needs, income is uncorrelated with well-being ($\beta rich = 0$) and secondly, whether the well-being-income relationship determined for poor nations differ from that determined for rich nations ($\beta poor > \beta rich$).

The empirical assessment is estimated by applying the ordered probit technique to integrated 2008 EVS data. Individual well-being levels are measured by self-reported happiness and life satisfaction EVS data. The measure of economic development is the log of GDP per capita based on PPP (in international $), obtained from the World Bank's, International Comparison Program database. "Rich" nations are defined as those with per capita income in excess of $15,000 and "poor" nations as those with per capita income of less than $15,000 (Layard, 2003). The computer package used in this chapter is Stata, Version 13. The sample means and standard deviations for the dependent (happiness and life satisfaction) and independent variables can be seen in Table 3.4.4 in Chapter 3.

The empirical assessment, of whether nations of diverse levels of economic development possess various average levels of national well-being, is derived from ordered probit regressions of the following form:

$$WB_n = \alpha + \beta poor I(GDP_n < k) \times (log(GDP_n) - log(k)) + \beta rich I(GDP_n \geq k) \times (log(GDP_n) - log(k)) + \varepsilon_n \quad \textbf{(5.1a)}$$

Where:

WB	=	dependent variable namely national well-being
n	=	nation
a	=	constant
βpoor	=	well-being-income gradient for "poor" nations (GDP<$k)
GDP	=	per capita gross domestic product
k	=	cut of level of GDP per capita
βrich	=	well-being-income gradient for "rich" nations (GDP≥$k)
ε	=	error term

The coefficients on the explanatory variables are the interaction of log per capita GDP with a dummy variable depicting if per capita GDP is over or under a cut of level, $k ($15,000). The functional form, when calculating log(GDP) relative to a threshold income, permits for a shift in the well-being-income gradient once per capita GDP surpasses the particular threshold. This specification enables this chapter to test two variations of the modified Easterlin hypothesis. Firstly this chapter tests whether, beyond a particular threshold of basic needs, income is uncorrelated with well-being (βrich = 0) and secondly, whether the well-being-income relationship determined for poor nations differ from that determined for rich nations (βpoor > βrich). The above cross-national regression form is consistent with that used in Stevenson and Wolfers (2013).

The interpretation of the coefficients is in terms of the underlying latent variable, well-being. In ordered probit regressions a positive coefficient means that the corresponding variable raises the latent dependent variable. Alternatively, a negative coefficient decreases the latent dependent variable (Verbeek, 2002). The sign of the coefficients are restricted to stating the qualitative effect of the explanatory variable (Jones, 2007; Maddala, 1983). Therefore, the coefficient estimates found in this chapter should be interpreted as follows: variables with a positive coefficient increase an individual's well-being while explanatory variables with a negative coefficient decrease an individual's well-being.

For a more comprehensive analysis the quantitative effects are also explained using marginal effects which are the predicted probabilities of a dependent (well-being) outcome occurring (Clark, 1998). The relevant Z-statistics are also illustrated which test the null hypothesis that the corresponding independent variable has no effect on

well-being($H_0: \beta = 0$). The Z-statistics are included for statistical inferences at the conventional 1%, 5% and 10% levels.

In addition to the statistical evidence, this chapter exhibits a scatter plot and a non-parametric fit of the well-being-income data in Figure 5.2.1 and Figure 5.2.2. These figures enable a visual assessment of whether the income-well-being relationship changes at any particular income level threshold. This scatter plot displays average levels of well-being and GDP per capita plotted on a log scale. The solid line of this scatter plot reveals the results from an OLS regression, estimated for all observations:

$$WB_n = \alpha + \beta \, log \, (GDP_n) + \varepsilon_n \qquad \textbf{(5.1b)}$$

Where:

WB	=	dependent variable namely well-being
n	=	nation
a	=	constant
log GDP	=	explanatory variable
ε	=	error term

This scatter plot visually depicts the well-being-GDP relationship. A local linear regression in the form of a dotted line is also illustrated. This permits a non-parametric fit of the well-being-income relationship. If a particular national income level, beyond which a change in the well-being-income relationship exists, than this non-parametric fit would flatten out once this particular national income level is reached. This scatter plot and non-parametric fit is consistent with that used in Stevenson and Wolfers (2013).

In addition to the above macroeconomic empirical analyses this chapter also evaluates the within nation evidence of a satiation point in the well-being-income relationship. The microeconomic empirical work of this chapter compares the reported well-being levels of rich and poor individuals in a given nation at a particular point in time. This empirical work presents an analysis of the existence of a particular income level beyond which a change in the well-being-annual-household-income relationship occurs. Data on individual well-being and annual household income are obtained from the 2008 wave of the EVS. “Rich” individuals are defined as those with an annual

household income in excess of $15,000 and "poor" individuals as those with an annual household income of less than $15,000 (Layard, 2003).

The statistical assessment is estimated by ordered probit regressions of well-being against the log of annual household income of the following form:

$$WB_i = \alpha + \beta poorI(Y_i < k) \times (log(Y_i) - log(k)) + \beta richI(Y_i \geq k) \times (log(Y_i) - log(k)) + \varepsilon_i \quad \textbf{(5.1c)}$$

Where:

WB	=	dependent variable namely well-being
i	=	individual
a	=	constant
βpoor	=	well-being-income gradient for "poor" individuals (y<$k)
βrich	=	well-being-income gradient for "rich" individuals (y ≥$k)
Y	=	annual household income
k	=	cut of level of annual household income
ε	=	error term

The explanatory variables are the interaction of log annual household income with a dummy variable depicting if annual household income is over or under a cut of level, $k ($15,000). The functional form, when calculating log(Y) relative to a threshold income, allows for a shift in the well-being-income gradient when annual household income exceeds the income threshold. A discontinuous change in well-being when annual household income is in excess of $k, is however, ruled out. This condition permits this chapter to test the two variations of the modified Easterlin hypothesis. Firstly, this chapter assesses if, beyond a specific threshold of basic needs, household income is uncorrelated with well-being (βrich = 0) and secondly, whether the well-being-income relationship determined for poor individuals diverge from that specified for rich individuals (βpoor > βrich). The above within-nation regression form is consistent with that used in Stevenson and Wolfers (2013).

5.2: Non-Parametric Fit of the Well-Being-Income Relationship

This section provides scatter plots and non-parametric fits of the well-being-income data. This enables visual assessment of whether the well-being-income relationship changes at any particular income level threshold.

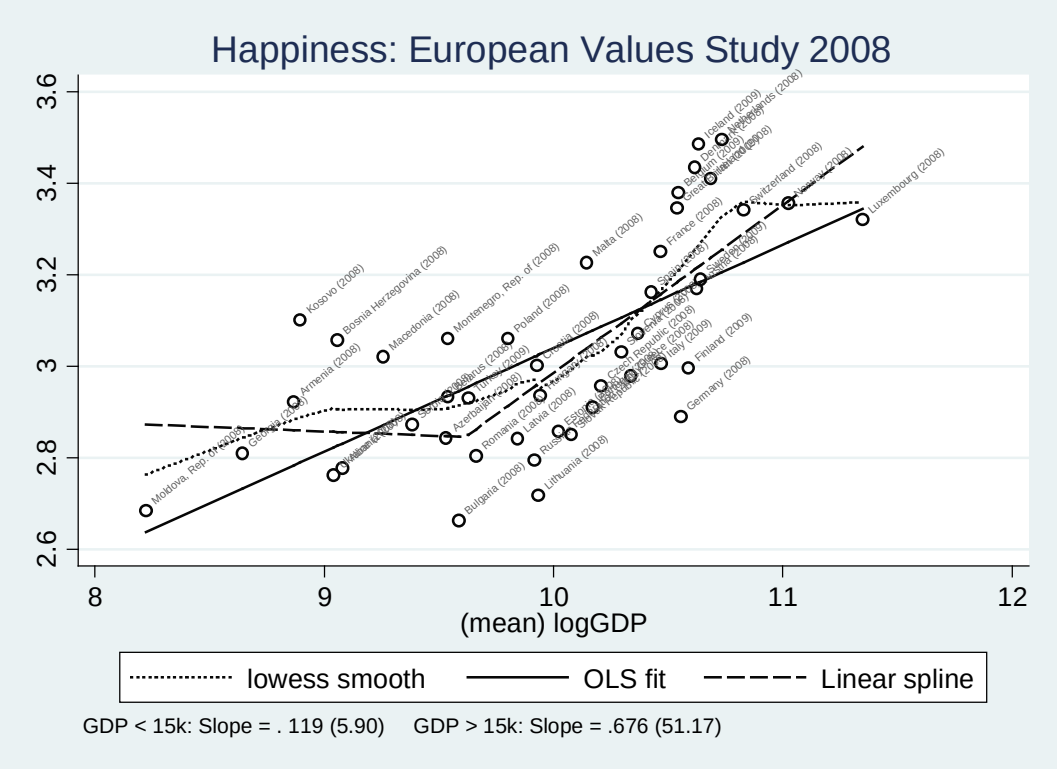
5.2.1: Non-Parametric Fit of the Happiness Income Relationship

Figure 5.2.1 illustrates average levels of happiness obtained from the 2008 wave of the EVS and GDP per capita measured at PPP and plotted on a log scale. Data on 45 European nations are included. This sample accounts for the majority of European nations across a vast spectrum of economic development. Happiness and log GDP per capita have a correlation level of 0.2092 (p-value of 0.000). The solid line in Figure 5.2.1 exhibits the results from an OLS regression, estimated for all observations.

A clear positive happiness-GDP relationship is depicted. Thus, individuals living in higher GDP per capita nations report higher levels of average happiness than individuals living in poorer nations. The estimated happiness-income gradient (β) is .216 (1% significance level). This finding contradicts the Easterlin paradox which suggests no relationship between the level of economic development in a nation and the average well-being of its citizens.

Figure 5.2.1 also shows a local linear regression in the form of a dotted line. This permits a non-parametric fit of the happiness-income relationship. If a particular national income level, beyond which a change in the happiness-income relationship exists, than this non-parametric fit would flatten out once this particular national income level is reached. As depicted however, the line does not flatten out for rich nations. Thus, this thesis fails to find a threshold national income level beyond which the happiness-income relationship is different. Indeed, the non-parametric fit seems to be steeper among rich nations. Thus, a stronger happiness gradient seems to exist among nations with GDP per capita exceeding $15,000.

Figure 5.2.1: Non-Parametric Fit of the Happiness-LogGDP Data



(Source: Author's own. Note: Calculations based on the 2008 integrated happiness data of the EVS. The solid line illustrates results from an OLS regression of happiness on log GDP per capita. The dashed line allows the slope to shift at a per capita GDP of $15,000, respectively. The dotted line displays a lowess smooth with bandwidth set at 0.8)

5.2.2: Non-Parametric Fit of the Life Satisfaction Income Relationship

Figure 5.2.2 displays average levels of life satisfaction attained from 2008 EVS data and GDP per capita measured at PPP and plotted on a log scale. Life satisfaction and log GDP per capita have a correlation level of 0.2153 (p-value of 0.000). The solid line in Figure 5.2.2 illustrates OLS regression results, assessed for all observations.

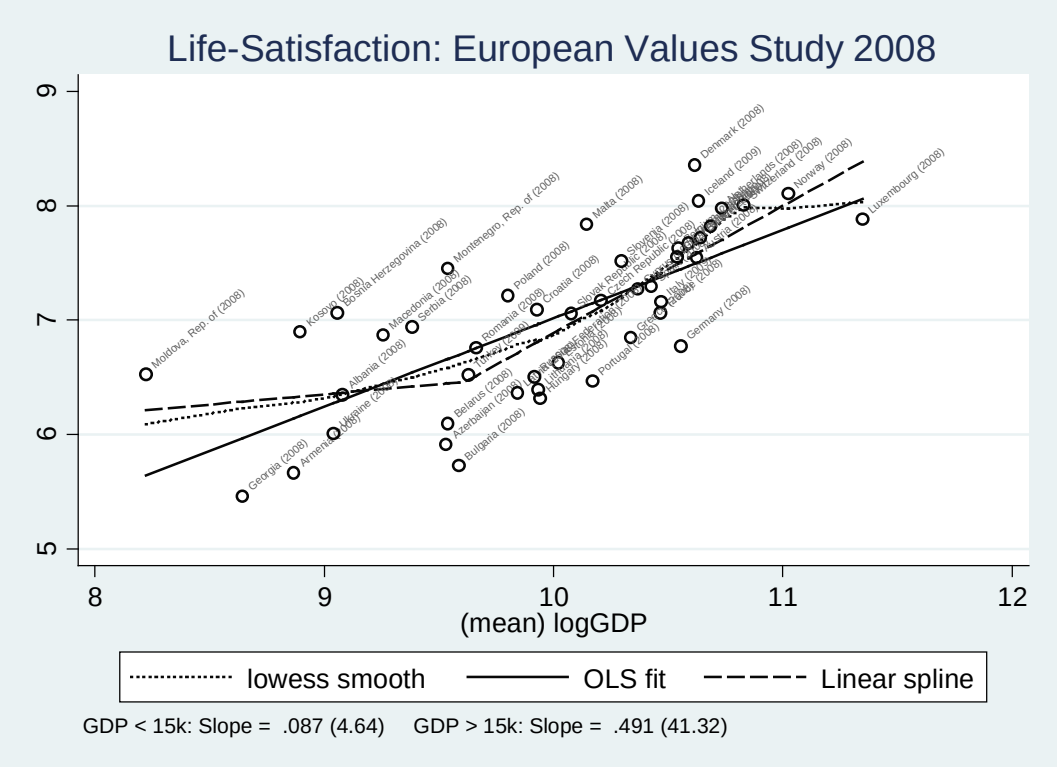
A positive life-satisfaction-GDP relationship is evident. Therefore, residents of higher GDP per capita countries report higher levels of average life satisfaction than residents of poorer nations. The estimated life-satisfaction-income gradient (β) is .742 (1% significance level). The local linear regression in the form of a dotted line finds no threshold national income level beyond which the life-satisfaction-income relationship is different. In fact, the non-parametric fit appears to be steeper among rich nations. Therefore, a stronger life satisfaction gradient seems to exist among nations with GDP per capita in excess of $15,000 than for nations with GDP per capita under $15,000.

The conclusion from Figure 5.2.1 and Figure 5.2.2 is that there appears to be a strong positive link between well-being and GDP per capita, even when the association only includes developed nations. This finding rejects the modified Easterlin hypothesis and indeed the Easterlin paradox.

This thesis also tests alternative income threshold levels beyond which a change in the well-being-income relationship occurs. The income level beyond which further income fails to yield greater well-being is typically reported, by economic studies, as being anywhere between $8,000 and $25,000 (Stevenson & Wolfers, 2013). Figure A5.2.1/A5.2.2 in the appendix exhibits average levels of happiness and life satisfaction obtained from the 2008 wave of the EVS and GDP per capita measured at PPP and plotted on a log scale. The dashed lines allow the slope to shift at a per capita GDP of $8,000 and $25,000. A distinct positive well-being-GDP relationship is depicted. This finding challenges the accuracy of the Easterlin paradox. Figure A5.2.1 and Figure A5.2.2 also depict a non-parametric fit of the well-being-income relationship. This non-parametric fit does not flatten out for rich nations. Consequently, this chapter does not detect a threshold national income level beyond which the well-being-income relationship is different. Indeed, the non-parametric fit

seems to be steeper among rich nations. This finding discredits the modified Easterlin hypothesis.

Figure 5.2.2: Non-Parametric Fit of the Life-Satisfaction-LogGDP Data



(Source: Author's own. Note: Calculations based on the 2008 integrated life satisfaction data of the EVS. The solid line displays results from an OLS regression of life satisfaction on log GDP per capita. The dashed line allows the slope to shift at a per capita GDP of $15,000, respectively. The dotted line exhibits a lowess smooth with bandwidth set at 0.8)

5.3: Cross National Evidence of a Satiation Point in the Well-Being-Income Relationship

This section conducts an empirical analyses of an examination of a threshold income level above which the well-being-income relationship changes. Table 5.3 displays ordered probit regression results estimating the well-being-logGDP gradient with a cut-off level of per capita GDP of $15,000. Thus, separate "rich nation" and "poor nation" order probit regressions are estimated. The Model 1 regressions, depicted in Table 5.3, are completed on the whole sample of European nations[5.3]. The samples in Model 2 and Model 3 consist of nations with GDP per capita above or below $15,000. This permits the assessment of whether the well-being-GDP gradient fluctuates for rich and poor nations. "Rich" nations are defined as those with per capita income in excess of $15,000 and "poor" nations as those with per capita income of less than $15,000.

The well-being regressions include standard demographic and individual controls. These include national income as well as religion, health, job satisfaction, gender, marital status, employment and age. The measure of economic development is the log of GDP per capita based on PPP (in international $), obtained from the World Bank's, International Comparison Program database.

[5.3] Model 1 is an ordered probit regression estimating the well-being-logGDP gradient for all European nations.
Model 2 is an ordered probit regression estimating the well-being-logGDP gradient for rich European nations.
Model 3 is an ordered probit regression estimating the well-being-logGDP gradient for poor European nations.

Model 1 illustrates results for individuals living in both rich and poor nations. A positive relationship, between aggregate well-being levels and GDP per capita, is found. Thus, nations with higher GDP on average report higher levels of life satisfaction and happiness than nations with lower GDP. The marginal effects in Table 5.3(a) show that an increase in GDP rises the probability of reporting oneself as "very happy" by 4.5%. The marginal effects, when using life satisfaction as a dependent variable, illustrates that increasing GDP rises the probability of reporting a life satisfaction level of 10 by 1.7 percentage points.

Model 2 reveals results for individuals living in rich nations. The well-being-national-income gradient remains strong for rich nations and thus, this chapter rejects the first hypothesis ($\beta rich = 0$) that beyond a particular threshold of basic needs, income is uncorrelated with well-being. The marginal effects results in Table 5.3(a) depict that rising GDP increases the probability by 3.3 percentage points, for individuals living in rich nations, of stating the highest life satisfaction level. In Table 5.3(a) the marginal effects illustrate that rising GDP increases the probability of reporting oneself as "very happy" by 11.3%.

Model 3 illustrates results for individuals living in poor nations. A positive relationship between aggregate well-being levels and GDP per capita is found. Thus, poor nations with higher GDP on average report higher levels of life satisfaction and happiness than poor nations with lower GDP. The marginal effects in Table 5.3(a) show that an increase in GDP rises the probability of individuals in poor nations reporting themselves as "very happy" by 8.5%. The marginal effects, when using life satisfaction as a dependent variable, illustrates that increasing GDP in a poor nation increases the probability of reporting a life satisfaction level of 10 by 2.4 percentage points.

When comparing Model 2 and Model 3, results show a stronger well-being gradient among nations with GDP per capita exceeding $15,000. Thus, the estimate of β_{rich} in fact exceeds that for β_{poor}. Therefore, this chapter rejects the second hypothesis ($\beta poor > \beta rich$): that the well-being-income relationship determined for poor economies differs from that determined for rich economies.

These cross national results reject the Easterlin paradox and indeed fail to identify an explanation as to why the Easterlin paradox suggests no link between a nation's economic development and its average level of well-being. A clear positive relationship between average levels of well-being and GDP per capita across nations is established in this chapter. Indeed this relationship holds and is highly statistically significant (at the 1% or 5% level) for all 6 regressions in Table 5.3. Therefore, a highly statistically positive relationship between national well-being and national income is found whether; well-being is measured by the happiness or life satisfaction variable; the whole sample, rich sample or poor sample is analysed. No evidence of a satiation threshold, beyond which richer nations have no further increases in well-being when GDP per capita rises, is found.

This thesis also tests alternative income threshold levels beyond which a change in the well-being-income relationship occurs. The income level beyond which further income fails to yield greater well-being is typically reported, by economic studies, as being between $8,000 and $25,000 (Stevenson & Wolfers, 2013). Table A5.3.1 and Table A5.3.2 in the appendix demonstrate an ordered probit regression estimating the well-being-logGDP gradient with a cut-off level of per capita GDP of $8,000 and $25,000. Results are similar to those above: Rich nations on average report higher levels of well-being than poor nations.

Table 5.3: Cross National Evidence of a Satiation Point in the Well-Being-Income Relationship, Ordered Probit Results

Well-Being-Data	β_{all} and Z-Stat (1)	β_{rich} and Z-Stat (2)	β_{poor} and Z-Stat (3)
Life Satisfaction Data			
logGDP	0.098*** (10.66)	0.188*** (11.28)	0.044** (2.23)
Model Summary			
Observations	66221	46780	19441
LR chi2	16043.66	12196.46	3209.45
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R2	0.0575	0.0639	0.0373
Log likelihood	-131557.85	-89400.198	-41384.478
Happiness Data			
logGDP	0.172*** (16.59)	0.393*** (20.73)	0.096*** (4.39)
Model Summary			
Observations	65869	46576	19293
LR chi2	18672.25	13586.62	4644.43
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R2	0.1375	0.1440	0.1154
Log likelihood	-58581.244	-40398.7	-17806.731

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 5.3(a): Marginal Effects of the Cross National Evidence of a Satiation Point in the Well-Being-Income Relationship

Well-Being-Data	All dy/dx and Z-Stat (1)	Rich dy/dx and Z-Stat (2)	Poor dy/dx and Z-Stat (3)
Life Satisfaction			
logGDP	0.017*** (10.63)	0.033*** (11.23)	0.024** (2.23)
Happiness			
logGDP	0.045*** (16.56)	0.113*** (20.69)	0.085*** (4.39)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

5.4: Within Nation Evidence of a Satiation Point in the Well-Being-Income Relationship

In this section's empirical work, comparisons of the reported well-being levels of rich and poor individuals in a given nation at a particular point in time is evaluated. Data on individual well-being and annual household income is obtained from the 2008 EVS wave. "Rich" individuals are defined as those with an annual household income in excess of $15,000 and "poor" individuals as those with an annual household income of less than $15,000. Models 1 in Table 5.4 and Table 5.4.1 show the ordered probit results of well-being on log household income for the whole sample of individuals in each specific European nation[5.4]. The samples in Models 2 and Models 3 consist of individuals, in each nation, with an annual household income above or below $15,000. This permits the assessment of whether the well-being-household-income gradient fluctuates for rich and poor individuals.

No verification of a significant break in the well-being-income relationship is found. Table 5.4/5.4.1 displays an ordered probit regression approximating the happiness/life satisfaction-income gradient with a cut-off level of household annual income of $15,000. Model 1 illustrates results when the whole sample is used. Results reveal a clear statistically significant positive happiness/life satisfaction-income relationship. Therefore, the richer, an individual living in a particular European nation is, the greater that individual's average happiness/life satisfaction will be. This result is consistent with that found for Ireland in Table 4.2 in Chapter 4.

[5.4] Model 1 is an ordered probit regression estimating the well-being-household-income gradient for all citizens in each spesific European nation.
Model 2 is an ordered probit regression estimating the well-being-household-income gradient for rich citizens in each spesific European nation.
Model 3 is an ordered probit regression estimating the well-being-household-income gradient for poor citizens in each spesific European nation.

In order to assess the existence of a particular income level beyond which a change in the well-being-income relationship occurs separate rich and poor regressions are analysed. In Table 5.4 Model 2 coefficients depict results for rich individuals and Model 3 depicts results for poor individuals. Broadly results exhibit a positive happiness-income relationship for both rich and poor regressions. The nations with statistically significant positive regression results in Model 2 show that the happiness-income gradient remains strong for rich individuals. Therefore, for these nations the hypothesis that beyond a particular threshold of basic needs, income is uncorrelated with happiness ($\beta rich = 0$), is rejected.

Similarly, Model 2 and Model 3 in Table 5.4.1 depict rich and poor life satisfaction regression results. Model 2 illustrates findings for rich individuals. The nations with statistically significant positive regression results reveal that the life-satisfaction-income gradient remains strong for rich individuals. Therefore, for these nations the hypothesis that beyond a particular threshold of basic needs, income is uncorrelated with life satisfaction ($\beta rich = 0$), is rejected. Four exceptions, namely Azerbaijan, Croatia, Poland and Ukraine, exist. Thus, for these nations the hypothesis cannot be rejected.

Table 5.4: Within Nation Evidence of a Satiation Point in the Well-Being-Income Relationship, Ordered Probit Happiness Results

Happiness-Data	β_{all} and Z-Stat (1)	β_{rich} and Z-Stat (2)	β_{poor} and Z-Stat (3)
Albania	0.194*** (4.63)	0.214 (1.34)	0.154*** (2.62)
Armenia	0.153*** (3.97)	0.466 (0.88)	0.187*** (4.26)
Austria	0.169*** (2.63)	0.180* (1.82)	0.461* (1.80)
Azerbaijan	0.110*** (2.75)	0.181 (0.71)	0.081 (1.35)
Belarus	-0.002 (-0.04)	0.338 (1.45)	0.003 (0.03)
Belgium	0.115* (1.77)	0.093 (1.11)	-0.421 (-1.23)
Bosnia Herzegovina	0.199*** (3.90)	0.306 (1.12)	0.207*** (3.12)
Bulgaria	0.193*** (3.82)	0.384 (1.57)	0.194*** (2.79)
Croatia	0.108*** (2.64)	0.224 (1.58)	0.054 (0.75)
Cyprus	0.102 (1.50)	-0.030 (-0.26)	0.405** (2.03)
Czech Republic	0.051 (0.74)	0.032 (0.22)	-0.025 (-0.16)
Denmark	0.306*** (3.47)	0.328*** (2.86)	0.169 (0.33)
Estonia	0.092 (1.57)	-0.076 (-0.55)	0.124 (1.08)
Finland	0.207*** (4.14)	0.232** (2.43)	0.064 (0.32)
France	0.142** (2.49)	0.218** (2.48)	0.235 (1.32)
Georgia	0.173*** (4.70)	0.258 (0.49)	0.136*** (3.30)
Germany	0.296*** (4.94)	0.322*** (3.64)	0.398** (2.00)
Great Britain	0.115** (2.11)	0.176** (2.07)	0.073 (0.46)
Greece	0.155*** (2.89)	0.107 (0.97)	0.521*** (4.16)
Hungary	0.043 (0.71)	0.115 (0.40)	0.043 (0.52)
Iceland	0.078 (1.05)	0.053 (0.47)	-1.029* (-1.91)
Ireland	0.039 (0.44)	0.102 (0.67)	-0.047 (-0.21)
Italy	0.102* (1.84)	0.042 (0.44)	0.091 (0.56)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy". Significance levels: ***1%, **5%, *10%)*

Table 5.4 continued: Within Nation Evidence of a Satiation Point in the Well-Being-Income Relationship, Ordered Probit Happiness Results

Happiness-Data	β_{all} and Z-Stat (1)	β_{rich} and Z-Stat (2)	β_{poor} and Z-Stat (3)
Latvia	0.149** (2.50)	-0.190 (-1.08)	0.335*** (3.61)
Lithuania	0.352*** (4.30)	0.381 (1.38)	0.263** (2.05)
Luxembourg	0.294*** (4.53)	0.300*** (4.06)	-0.171 (-2.56)
Macedonia	0.068** (2.00)	-0.082 (-0.75)	0.196*** (2.69)
Malta	0.038 (0.59)	0.013 (0.14)	0.246 (1.12)
Moldova	0.219*** (5.83)	(omitted)	0.225*** (5.81)
Montenegro	0.057 (1.34)	0.012 (0.06)	0.042 (0.68)
Netherlands	0.082 (1.45)	0.115 (1.46)	-0.122 (-0.52)
Northern Cyprus	0.118 (1.46)	0.007 (0.05)	0.046 (0.16)
Northern Ireland	0.208* (1.80)	0.295 (1.49)	0.418 (0.96)
Norway	0.345*** (4.56)	0.323*** (3.12)	omitted)
Poland	0.022 (0.44)	0.025 (0.30)	-0.113 (-0.79)
Portugal	0.116** (2.20)	-0.144 (-1.27)	0.273** (2.26)
Romania	0.076** (2.03)	0.020 (0.17)	0.087 (1.26)
Russian Federation	0.084* (1.68)	0.065 (0.19)	0.190*** (2.85)
Serbia	0.113*** (2.79)	-0.323 (-1.35)	0.119** (2.30)
Slovak Republic	0.399*** (4.74)	0.085 (0.39)	0.473*** (3.38)
Slovenia	0.074 (1.05)	0.099 (0.79)	-0.028 (-0.13)
Spain	0.047 (1.19)	-0.012 (-0.15)	0.149 (1.64)
Sweden	0.161*** (2.63)	0.153* (1.66)	0.138 (0.58)
Switzerland	0.125** (2.10)	0.220** (2.28)	-0.348 (-1.64)
Turkey	0.114*** (3.06)	0.460 (1.28)	0.135*** (3.02)
Ukraine	0.149*** (3.20)	0.049 (0.10)	0.124** (2.27)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy". Significance levels: ***1%, **5%, *10%. Omitted = omitted due to no within-group variance)*

Table 5.4.1: Within Nation Evidence of a Satiation Point in the Well-Being-Income Relationship, Ordered Probit Life Satisfaction Results

Life Satisfaction-Data	β_{all} and Z-Stat (1)	β_{rich} and Z-Stat (2)	β_{poor} and Z-Stat (3)
Albania	0.119*** (3.18)	-0.208 (-1.53)	0.130** (2.47)
Armenia	0.251*** (7.06)	0.261 (0.57)	0.220*** (5.49)
Austria	0.319*** (5.68)	0.281*** (3.25)	0.807*** (3.83)
Azerbaijan	0.153*** (4.55)	-0.416** (-2.33)	0.238*** (4.61)
Belarus	-0.005 (-0.13)	0.086 (0.54)	-0.076 (-1.23)
Belgium	0.212*** (3.84)	0.162** (2.29)	-0.469* (-1.79)
Bosnia Herzegovina	0.183*** (4.09)	0.506** (2.21)	0.137** (2.33)
Bulgaria	0.271*** (5.75)	0.507** (2.35)	0.305*** (4.69)
Croatia	-0.001 (-0.03)	-0.232* (-1.96)	-0.000 (-0.01)
Cyprus	0.258*** (4.17)	0.368*** (3.50)	0.014 (0.08)
Czech Republic	0.101* (1.77)	0.194* (1.68)	0.040 (0.32)
Denmark	0.207*** (2.73)	0.178* (1.79)	0.317 (0.76)
Estonia	0.178*** (3.71)	-0.051 (-0.47)	0.130 (1.33)
Finland	0.181*** (4.34)	0.202** (2.54)	0.082 (0.54)
France	0.126** (2.57)	0.068 (0.92)	-0.018 (-0.12)
Georgia	0.182*** (5.40)	1.077*** (2.60)	0.186*** (4.90)
Germany	0.329*** (6.43)	0.496*** (6.68)	-0.068 (-0.40)
Great Britain	0.050 (1.05)	0.095 (1.32)	-0.074 (-0.54)
Greece	0.134*** (2.72)	-0.055 (-0.56)	0.469*** (4.08)
Hungary	0.157*** (2.92)	0.077 (0.33)	0.163** (2.22)
Iceland	0.073 (1.15)	0.101 (1.09)	-0.766*** (-2.66)
Ireland	0.270*** (3.57)	0.289** (2.28)	0.448** (2.27)
Italy	0.132*** (2.69)	0.061 (0.75)	0.396*** (2.66)

*(Source: Author's own. Dependent variable: Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 5.4.1 continued: Within Nation Evidence of a Satiation Point in the Well-Being-Income Relationship, Ordered Probit Life Satisfaction Results

Life Satisfaction-Data	β_{all} and Z-Stat (1)	β_{rich} and Z-Stat (2)	β_{poor} and Z-Stat (3)
Latvia	0.108** (2.15)	0.224 (1.63)	0.170** (2.14)
Lithuania	0.158** (2.50)	0.590*** (2.86)	0.038 (0.38)
Luxembourg	0.251*** (4.49)	0.283*** (4.43)	-9.632 (-0.00)
Macedonia	0.007 (0.22)	-0.026 (-0.28)	0.070 (1.06)
Malta	0.054 (0.94)	0.107 (1.27)	0.017 (0.09)
Moldova	0.080** (2.37)	(omitted)	0.071** (2.03)
Montenegro	0.071* (1.86)	0.069 (0.41)	-0.009 (-0.16)
Netherlands	0.068 (1.40)	0.153** (2.33)	-0.370* (-1.90)
Northern Cyprus	0.142* (1.93)	0.057 (0.45)	-0.416 (-1.60)
Northern Ireland	0.067 (0.68)	0.148 (0.93)	0.603 (1.59)
Norway	0.209*** (3.24)	0.242*** (2.75)	(omitted)
Poland	-0.027 (-0.65)	-0.203*** (-3.04)	0.134 (1.12)
Portugal	0.048 (1.11)	-0.130 (-1.52)	0.168 (1.57)
Romania	0.094*** (2.81)	0.054 (0.52)	0.107* (1.73)
Russian Federation	0.210 (4.87)	0.042 (0.17)	0.274*** (4.62)
Serbia	0.083** (2.28)	-0.256 (-1.26)	0.074 (1.59)
Slovak Republic	0.169** (2.34)	0.211 (1.19)	0.310** (2.55)
Slovenia	0.068 (1.07)	0.011 (0.10)	-0.023 (-0.12)
Spain	0.044 (1.29)	-0.073 (-1.05)	0.152* (1.91)
Sweden	0.131** (2.48)	0.174** (2.18)	-0.038 (-0.20)
Switzerland	0.151*** (2.96)	0.347*** (4.14)	-0.190 (-1.16)
Turkey	0.138*** (3.94)	0.395 (1.23)	0.147*** (3.46)
Ukraine	0.121*** (2.93)	-0.988*** (-2.67)	0.084* (1.71)

*(Source: Author's own. Dependent variable: Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%. Omitted = omitted due to no within-group variance)*

5.5: Difference Between Life Satisfaction and Happiness Results

Many studies, despite having two distinct meanings, use the term happiness and life satisfaction interchangeably (Gerdtham & Johannesson, 2001; Frey & Stutzer, 2000a; Ferrer-i-Carbonell, 2005). This chapter identifies whether the effect of income on well-being is affected by the different definitions of well-being, namely that of happiness and life satisfaction. This thesis defines happiness and life satisfaction similar to the definitions used by Helliwell and Putnam (2004). Life satisfaction data is derived from the following EVS question: "*How satisfied are you with your life?"* Interviewees ranked their responses on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). This refers to the overall cognitive evaluation of an individual's own life. Happiness data is derived from the EVS question which reads as follows: *"All things together how happy are you?*" Interviewees ranked their responses on an ordered scale, with the options of choosing "not at all happy", "not very happy", "quite happy" or "very happy". This refers to immediate positive or negative emotions experienced by an individual when considering all aspects of their life.

The subjective well-being data does not have a natural scale (Sacks *et al.,* 2010). The two well-being measures that are considered are life satisfaction measured on a 10-point scale and happiness measured on a four-point scale. Thus, a discrepancy in the scale occurs. In order to make the coefficients from survey linear estimation on the 10-point life satisfaction equation more easily comparable with those from the 4-point happiness equation Table 5.5 collapses the life satisfaction data into a 4-point scale.

Similar to that done in Kapferer *et al*., (2012) the measure of life satisfaction labelled as "very satisfied" includes all respondents who ranked their life satisfaction with scores of 9 or 10. Correspondingly those who report a life satisfaction score of 1 or 2 are stated as being "not at all satisfied". Life satisfaction 3, 4 and 5 are collapsed and categorised as "not very satisfied". Likewise, individuals who are "quite satisfied" are referred to as having a life satisfaction score of 6, 7 or 8. Table 5.5, using an ordered probit model, tests whether individual income results in a positive effect on individual well-being when happiness and life satisfaction are both measured on a 4-point scale.

When distinguishing the life satisfaction and happiness results in Table 5.5 and Table 5.5(a), this chapter identifies explicit variances within an overall context of significant comparison. This is consistent with Caporale *et al*., (2009) whose empirical work shows slight differences in the size of the estimated coefficients between life satisfaction and happiness.

Cross national results depict a stronger association with happiness than with life satisfaction. Therefore, an increase in GDP per capita has a greater positive effect on resident's happiness (short term, situation-dependent expressions of mood) than life satisfaction (a long term, more stable evaluation of life). This result holds when all nations, rich nations or poor nations are analysed.

The marginal effects in Table 5.5(a) Model 1 show that increase in logGDP rises the probability of reporting oneself as "very happy" by 4.5% compared with the increased probability of 3.2% of reporting oneself as "very satisfied". Findings for rich individuals, in Table 5.5(a) Model 2, show that the probability of reporting oneself as "very happy" rises by 11.3% if national GDP increases. Upsurges in GDP rises the probability of reporting oneself as "very satisfied" by 6.1%. Likewise poor individual results in Model 3 illustrate that an increase in logGDP rises the probability of reporting oneself as "very happy" by 8.5 percentage points and the highest life satisfaction level by 3.2 percentage points.

Table 5.5: Cross National Evidence of a Satiation Point in the Well-Being-Income Relationship, Happiness and Life Satisfaction on a 4-Point Scale

Well-Being-Data	β_{all} and Z-Stat (1)	β_{rich} and Z-Stat (2)	β_{poor} and Z-Stat (3)
Life Satisfaction Data			
logGDP	0.103*** (10.42)	0.188*** (10.37)	0.113*** (4.64)
Model Summary			
Observations	54445	37035	17410
LR chi2	12345.63	9050.01	2831.95
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R2	0.0946	0.1067	0.0640
Log likelihood	-59055.161	-37885.316	-20694.697
Happiness Data			
logGDP	0.172*** (16.59)	0.393*** (20.73)	0.096*** (4.39)
Model Summary			
Observations	65869	46576	19293
LR chi2	18672.25	13586.62	4644.43
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R2	0.1375	0.1440	0.1154
Log likelihood	-58581.244	-40398.7	-17806.731

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on a four point scale from 1 (dissatisfied) to 4 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 5.5(a): Marginal Effects of the Cross National Evidence of a Satiation Point in the Well-Being-Income Relationship, Happiness and Life Satisfaction on a 4-Point Scale

Well-Being-Data	All dy/dx and Z-Stat (1)	Rich dy/dx and Z-Stat (2)	Poor dy/dx and Z-Stat (3)
Life Satisfaction			
logGDP	0.032*** (10.41)	0.061*** (10.37)	0.032*** (4.64)
Happiness			
logGDP	0.045*** (16.56)	0.113*** (20.69)	0.085*** (4.39)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on a four point scale from 1 (dissatisfied) to 4 (satisfied). Significance levels: ***1%, **5%, *10%)*

5.6: Post Estimation Diagnostics

The Likelihood Ratio Chi-Square (LR chi2) tests that at least one of the predictor's regression coefficient is not equal to zero (Syafitri, 2013). The likelihood ratio chi-square, for all regressions in this chapter, are between 2831.95 and 18672.25. All regressions have a Prob > chi2 (p-value) of 0.00. These results indicate that the models used in this chapter are statistically significant at the 99% confidence interval. For OLS and probit estimations, Pseudo R-squared may be used when measuring the strength of the association between the dependent and predictor variables (Syafitri, 2013). The pseudo-R squared values for regressions incorporated in Table 5.3 and Table 5.5 are between 0.0373 and 0.1440. This is in accordance with the usual finding within the literature, that approximately 20% or less of individual well-being depends on objective variables such as income, age, education and marital status (Kahneman *et al.*, 1999).

A Wald test is performed on the cut-off points displayed in Table A5.3(a, b & c) and Table A5.5(a, b & c) in the appendix. The Wald Test is used to test the joint significance of a subset of coefficients. For all regressions in this chapter the null hypothesis, that the cut-offs are jointly equal to zero, is rejected at the 1% significance level.

5.7: Chapter Conclusion

This chapter presents an empirical analysis of the existence of a particular income level beyond which a change in the well-being-income relationship occurs. This assertion is referred to as the modified Easterlin hypothesis (Stevenson & Wolfers, 2013). Two variations of the hypothesis are tested; Firstly that beyond a particular threshold of basic needs, income is uncorrelated with well-being; Secondly, that the well-being-income relationship determined for poor economies differs from that determined for rich economies. The empirical assessment is estimated by applying the ordered probit technique to data from the 2008 wave of the EVS. Individual well-being levels are measured by self-reported happiness and life satisfaction EVS data.

This chapter identifies a strong relationship between well-being and national income. This result challenges the Easterlin paradox. Across nation results, when estimating the well-being-logGDP gradient with a cut off level of per capita GDP of $15,000, reject both the first and second hypothesis. A visual examination of a non-parametric fit in the form of a local linear regression illustrates equivalent findings. Indeed, a highly statistically positive relationship between national well-being and national income is found whether: well-being is measured by happiness or life satisfaction data; a non-parametric or a more formal ordered probit regression analyses is employed; the entire sample, rich or poor sample is analysed. Therefore, no evidence of a satiation threshold, beyond which richer nations have no further increases in well-being when GDP per capita rises, is found. This result falsifies previous claims of a satiation point after which greater GDP per capita is not associated with higher well-being. This chapter rejects the Easterlin paradox and indeed fails to identify an explanation as to why the Easterlin paradox suggests no relationship between the average well-being of a nation and its level of economic development.

Economic growth matters only in so far as it increases individual well-being (Oswald, 1997). Therefore, evaluating policy prescriptions requires an accurate understanding of the well-being-income relationship. Existing literature is however, founded on fragile and incomplete evidence when concerning this relationship (Stevenson & Wolfers, 2008). If economic growth results in merely slight improvements in well-being beyond a particular income threshold, it should not be a primary aim of government policy in developed

economies (Stevenson & Wolfers, 2008) and current policies should shift focus from continuous economic growth to maximizing subjective well-being (Layard, 2005a). However this chapter's empirical work rejects the modified Easterlin hypothesis and finds no evidence of satiation. Therefore, this thesis recommends economic growth to remain a primary aim of European governments.

CHAPTER 6

ESTIMATION OF THE EFFECT OF INCOME-INEQUALITY ON INDIVIDUAL WELL-BEING LEVELS IN EUROPE

The aim of this thesis is to explore the possible explanations of the apparent contradictory results provided by Easterlin (1974), by using cross sectional data of European residents obtained from the 2008 wave of the EVS. Easterlin (1974) reports that average national well-being is unrelated to GDP per head. At the same time, Easterlin (1974) shows that, in the microeconomic literature, there is a statistically significant positive correlation between individual measures of subjective well-being and individual income. The aim of this thesis is achieved by estimating the well-being-income relationship in many different ways.

This chapter, in an attempt to explain the seemingly opposing results of the Easterlin paradox, offers an empirical analysis of the effect of income inequality on European resident's well-being levels. This thesis adopts Billingsley's (2014) definition and conceptualizes income inequality as a measure of income division, or dispersion within a particular nation.

This chapter is comprised of eight sections. Section 6.1 discusses the empirical techniques. Section 6.2 describes the effect of income inequality on aggregate national well-being levels. Section 6.3 presents the effect of income inequality on poor individuals. Section 6.4 estimates the effect of income inequality on rich individuals. Section 6.5 describes the difference between rich and poor individual results. A discussion of results is offered in each section. Section 6.6 presents the difference between life satisfaction and happiness results. Section 6.7 outlines the post estimation diagnostics. Section 6.8 concludes this chapter.

6.1: Empirical Techniques

Several economic empirical studies affirm that increases in income inequality cause deteriorations in average well-being levels. This chapter evaluates the validity of these findings by presenting an empirical analysis of the effect of income inequality on European resident's well-being levels. Three deviations of the hypothesis are tested:

- Firstly, if income inequality affects aggregate national well-being levels.
- Secondly, whether the well-being-income-inequality relationship for low income individuals varies from that of high income individuals.
- And lastly, if the consequence of income inequality on well-being is altered by the different definitions of well-being; specifically that of happiness and life satisfaction.

The empirical assessment is estimated by applying the ordered probit technique to cross sectional data of European residents obtained from the 2008 wave of the EVS. A subjective measure of life satisfaction and happiness is employed to quantify individual well-being. National income inequality rates are measured by the Gini coefficient acquired from Eurostat data. National income is GDP per capita based on PPP attained from the World Bank's, International Comparison Program database. "Rich" individuals are defined as those with annual household income in excess of $15,000 and "poor" individuals as those with annual household income of less than $15,000. The computer package used in this chapter is Stata, Version 13. The sample means and standard deviations for the dependent (happiness and life satisfaction) and independent variables may be found in Table 3.5.2 in Chapter 3.

The empirical assessment of this chapter is derived from ordered probit regressions of the following form:

$$WB_{int}^{ws}\ \bar{p}^{ws}_{\bar{r}} = a\ \bar{p}^{ws}_{\bar{r}}\ \text{Inequality}_{nt} + \beta\ \bar{p}^{ws}_{\bar{r}}\ \text{GDP}_{nt} + \delta\ \bar{p}^{ws}_{\bar{r}}\ \text{MICRO}_{int} + \varepsilon_{int}\ \bar{p}^{ws}_{\bar{r}} \quad \textbf{(6.1)}$$

Where:

WB	=	well-being responses namely happiness and life satisfaction
ws/p/r	=	states that either the whole sample, poor or rich individuals are considered
i	=	individual
n	=	nation
t	=	year (constant at 2008)
a	=	constant
Inequality	=	national income inequality
GDP	=	national GDP per capita, measured at PPP (international $)
MICRO	=	set of personal characteristics found to affect individual well-being
ε	=	error term

The empirical analysis of this chapter is based on three various specifications of equation (6.1). To test whether income inequality affects aggregate national well-being levels, the model includes national income inequality as well as national income, absolute income, religion, health, job satisfaction, gender, marital status, employment and age, as determinants of all European citizen's subjective well-being. National income inequality is measured by the Gini coefficient variable obtained from 2008 Eurostat data. Economic development lowers national inequality and reduces corruption and therefore, controlling for GDP per capita (national income) is required when deriving the effect of national income inequality on individual well-being levels (Zagorski *et al.*, 2014).

Data on individual well-being, annual household income and the MICRO (individual characteristics) variables are obtained from the 2008 wave of the EVS. In the EVS respondents did not record exact annual household income figures. The 2008 wave of the EVS records monthly household income (x1000) measured at PPP (in Euros). In order to acquire an annual household income measure for each individual a new income variable was created. An individual's annual household income was derived by multiplying the recorded monthly household income by 1000 and then by 12. 2008 European Central Bank data on the reference exchange rate of US dollar/euro is used in order to convert income data from euros into dollars. This new variable records annual household income measured at PPP (international $). The well-being function is primarily believed to be concave in income (Ferrer-i-Carbonell, 2005) and subsequently this thesis presents absolute income in logarithmic form.

To test whether the well-being-income-inequality relationship determined for low income individuals differ from that determined for high income individuals, this chapter divides EVS data into rich and poor individuals. "Rich" individuals are defined as those with an annual household income in excess of $15,000 and "poor" as those with an annual household income of less than $15,000 (Layard, 2003). Results from rich and poor European citizens are compared.

In order to test, if the effect of income inequality on well-being is affected by the various definitions of well-being, the first two hypotheses are tested twice. Firstly the EVS happiness variable is employed as a calculation of well-being and secondly, the EVS life satisfaction variable is used as a measure of well-being. Results from both well-being regressions are then compared.

The Gini coefficient is the most frequently used indicator of income inequality (Sen, 1973; Cowell, 1977). Indeed, except very few exemptions, economic literature on well-being and inequality calculate inequality by the Gini coefficient at the regional or national level (Ferrer-i-Carbonell & Ramos, 2014). The intent of this chapter is comparative in nature. This stems from the analyses of cross-sectional differences between European nations. Concerns about the comparability, of the used income inequality measurement, was central when determining what measurement to employ (Davidov *et al.*, 2011). In addition, the importance of comparing the results of this thesis with results from existing literature was considered. To accommodate the requirements concerning the comparability of the results of this thesis, income inequality is measured by the Gini coefficient in this chapter. This inequality measurement is easy to understand, has a confined range, takes all available information into consideration and allows comparisons between societies with diverse size and compositions (van Deurzen, 2015).

The interpretation of the coefficients is in terms of the underlying latent variable, well-being. In ordered probit regressions a positive coefficient means that the corresponding variable raises the latent dependent variable. Alternatively, a negative coefficient decreases the latent dependent variable (Verbeek, 2002). The sign of the coefficients are restricted to stating the qualitative effect of the explanatory variable (Jones, 2007; Maddala, 1983). Therefore, the coefficient estimates found in this chapter should be

interpreted as follows: a positive coefficient increases an individual's well-being while explanatory variables with a negative coefficient decreases an individual's well-being.

For a more comprehensive analysis the quantitative effects are also explained using marginal effects which are the predicted probabilities of a dependent (well-being) outcome occurring (Clark, 1998). The relevant Z-statistics are also illustrated which test the null hypothesis that the corresponding independent variable has no effect on well-being ($H_0: \beta = 0$). The Z-statistics are included for statistical inferences at the conventional 1%, 5% and 10% levels.

6.2: Effect of Income Inequality on Aggregate National Well-Being Levels

Table 6.2 aims to test whether national income inequality affects individual well-being in Europe. Model 1 and Model 2 display regression results for both the happiness and life satisfaction regressions[6.2]. Here results illustrate a highly significant negative relationship between well-being and national income inequality. Therefore, individuals living in nations which are characterised with high income inequality report lower levels of well-being. The marginal effects in Table 6.2(a) Model 1 reports a 0.3% reduction in the likelihood of stating "very happy" as ones well-being status when a rise in income inequality occurs. Alternatively, if income inequality increases the probability of reporting a 10 on the life satisfaction scale decreases by 0.4%.

Alesina *et al.,* (2004) support these findings in their study of well-being and income inequality in Europe. They attribute this negative relationship to the belief among Europeans that they are residents of a non-mobile society. If however, individuals believe themselves to live in a mobile society, one where personal effort is a significant factor determining income, than income inequality might be seen as fair. Income inequality is well documented in the literature as being a negative contributor to well-being (Blanchflower & Oswald, 2003; Ferrer-i-Carbonell & Ramos, 2010; O'Connell, 2004).

[6.2] Model 1 is an ordered probit regression estimating the happiness-income-inequality gradient for all European citizens where several personal and socio-economic independent variables are included.
Model 2 is an ordered probit regression estimating the life-satisfaction-income-inequality gradient for all European citizens where several personal and socio-economic independent variables are included.

The coefficients of the additional explanatory variables, in Table 6.2 do not present much variation from previous literature. What follows is a discussion of results which these additional independent variables depict.

National Income

The second independent variable considered in Table 6.2 is national income. Results display a positive relationship between aggregate well-being levels and GDP per capita. Therefore, individuals living in nations with greater GDP per capita report higher levels of well-being than individuals living in lower GDP per capita nations. The marginal effects in Table 6.2(a) Model 1 show that an increase in the logarithm of GDP increases the probability of reporting oneself as "very happy" by 11.5%. Likewise, as LogGDP increases, the probability of reporting the highest life satisfaction score increases by 2.3%.

Existing literature regarding this well-being-income relationship is founded on fragile and incomplete evidence (Stevenson & Wolfers, 2008). Easterlin (1974: 104) identifies that well-being levels do not have a strong correlation with average levels of national income. An on-going debate, concerning the accuracy of this finding exists (Diener *et al.,* 2013). Indeed Easterlin's (1974) finding has been widely disconfirmed (Easterlin, 1995; 2001; Di Tella *et al.*, 1999; Blanchflower & Oswald, 2004a; Inglehart, 1990). With Easterlin (1995: 42) even stating that "*a positive happiness-income relationship typically turns up in international comparisons*".

Absolute Income

Higher absolute income results in greater reported well-being, as the happiness and life satisfaction coefficients on log-absolute-income illustrate. Thus, richer individuals, *ceteris paribus,* report higher levels of well-being than fellow-citizens at the bottom of the income distribution.

The "logAbsolutincome" coefficient in Model 1 is significant and positive which suggests that higher absolute income has a significant positive effect on Happiness. The marginal effects in Table 6.2(a) show that as absolute income increases the probability of reporting the highest level of happiness increases by 40.3% for the whole sample. The absolute income coefficient in Model 2 is positive and statistically significant at the 1% level demonstrating that higher absolute household income results in higher life satisfaction.

Findings of Model 2 in Table 6.2(a) illustrate that an increase in absolute income results in a 2.4% probability increase of being in the highest life satisfaction category while the other variables in the model are held constant.

These absolute income results are in accordance with previous economic findings: namely that richer individuals, in a particular nation ceteris paribus, report higher levels of well-being than fellow-citizens at the bottom of the income distribution (Easterlin, 1974; Frey & Stutzer, 2000a). This positive relationship is vastly documented in the well-being literature (Easterlin, 1995; 2001; Shields & Price, 2005; Graham & Pettinato, 2002; Lelkes, 2006b). No literature has been identified that contradicts this finding (Easterlin, 2001).

Gender

The gender variable is statistically significant and results show that males report less well-being then females. This is similar to the findings of previous studies which indicate that women report greater well-being than their male counterparts (Alesina *et al.*, 2004; Borooah, 2006). The marginal effects, of reporting a well-being status of "very happy", show that being a man reduces this probability by 2%. The marginal effects, of reporting a 10 on the life satisfaction scale, decreases by 1% if a particular respondent is male.

Health

The next independent variable considered in Table 6.2 is the individual's self-assessed state of health measured on a five-point scale: where 1 represents "very good" health, 2 signifies "good" health, 3 means "fair" health, 4 illustrates "poor" health and 5 "very poor" health. Here "good" health is the base case. Health is found to have a positive effect on well-being. In Table 6.2 the coefficient results for "health fair", "health poor" and "health very poor" are all negative and statistically significant at the 1% level. This illustrates that individuals who report their health as being "good" possess greater well-being than individuals who report their health as being "fair", "poor" or "very poor".

In Model 1 the health "very good" coefficient is positive and statistically significant at the 1% level. This demonstrates that those who claim their health as being "very good" enjoy more happiness than those who report a health level of "good". Indeed, in Table 6.2(a) individuals who report "very good" heath increase the probability of reporting

themselves as “very happy” by 17.9%. These findings are in accordance with Lelkes (2006a), Gerdtham and Johannesson (2001), Clark and Oswald (1994) and Dolan *et al.*, (2008) who all report a significant positive relationship between well-being and health.

Having very poor health has the largest effect on well-being from all of the explanatory variables. This is excluding the absolute income variable in Table 6.2(a) Model 1 and the job satisfaction level of 10 in Table 6.2(a) Model 2. This is consistent with Helliwell (2003) and Borooah (2006) who find that the self-assessed health variable is the most significant of all the included variables when explaining well-being. Helliwell (2003) finds that a one point improvement in health (on a five-point scale) results in a 0.61 point increase in subjective well-being. Borooah (2006) finds that an improvement in health is predicted to increase the probability of being in the highest happiness category by 15.3 percentage points.

This chapter finds that the less healthy individuals report themselves as being the more negative effect health has on well-being. This is consistent with Easterlin (2003) study who finds that, on average, an averse change in health reduces life satisfaction and the worse the change in health the greater the reduction in life satisfaction. The marginal effects in Table 6.2(a) Model 1 show that recording “fair” health reduces the probability of reporting oneself as “very happy” by 11.1%. The probability of reporting oneself as “very happy” falls by 18.9% if one states a health level of “poor” and by 20.2% if “very poor” health is specified. In Model 2 those who state “fair” health are 5.3 percentage points less likely to enjoy a life satisfaction level of 10. This is compared to individuals that report a health status of “poor” who are 9.1% less probable to report the highest life satisfaction level. Whereas, stating “very poor” heath decreases the probability of reporting a life satisfaction level of 10 by 9.3%.

Job Satisfaction

Results report a positive relationship between well-being and job satisfaction. Thus, individuals who report higher job satisfaction *ceteris paribus* report higher levels of well-being. Respondents were asked to rank their levels of job satisfaction on a scale of 1 to 10, where 1 = dissatisfied and 10 = satisfied. Nine dummy variables for job satisfaction are included in Table 6.2 Model 1 and Model 2. The parameter estimates are relative to

the base case, in this case Jobsatisfied8. All the job satisfaction variables are statistically significant in both Model 1 and Model 2.

The job satisfaction coefficients ranging from "Jobdissatisfied" to "Jobsatisfied7" are negative and statistically significant. Thus, individuals who state that they possess a job satisfaction level of 1,2,3,4,5,6 or 7 report lower levels of well-being than individuals who possess a job satisfaction level of 8. The job satisfaction coefficients on "Jobsatisfied9" and "Jobsatishied" are positive. Therefore, those who report a job satisfaction level of 9 or 10 enjoy higher levels of well-being than individuals who possess a job satisfaction level of 8.

This finding suggests that higher job satisfaction results in higher well-being. Indeed Table 6.2(a) finds a consistent reduction in the probability of reporting the highest well-being level as one reduces job satisfaction levels. Two exceptions exist: namely "Jobsatisfied4" in Model 1 and "Jobdissatisfied" in Model 2 where respondents in these job satisfaction categories report a lower negative effect on well-being than individuals who clam a job satisfaction level of one point higher.

Unemployment

Being unemployed reduces well-being. The unemployment coefficient is negative and statistically significant in both Model 1 and Model 2 in Table 6.2. This illustrates the negative relationship between well-being and unemployment. This is consistent with previous literature such as Stutzer (2004), Di Tella *et al*., (2001), Frey and Stutzer (2000a), Clark and Oswald (1994) and Helliwell (2003). The marginal effects in Table 6.2(a) Model 1 show that being unemployed decreases the probability of reporting oneself as "very happy" by 7.9%. The marginal effects results in Model 2 depict that being unemployed reduces the probability by 5.7 percentage points of stating the highest life satisfaction level.

Disability

The EmpDisability (respondent has no paid employment resulting from disability) coefficient for Model 2 is negative and statistically significant. This statistically significant negative coefficient illustrates the negative relationship between life satisfaction and being disabled. This result is in comparison to individuals who are in paid

employment of 30 hours a week or more. This negative relationship between well-being and disability is consistent with previous literature such as Oswald and Powdthavee (2008). In Table 6.2(a) Model 2 the marginal effects illustrate that being disabled lowers the probability of reporting a life satisfaction level of 10 by 1.8%.

Retirement

A statistically significant positive EmpRetired (respondent has no paid employment resulting from being retired) coefficient is found. These results indicate that the retired report greater well-being than respondents with paid employment of 30 hours a week or more. In Table 6.2(a) Model 1 the marginal effects illustrate that being retired increases the probability of reporting oneself as "very happy" by 2.4 percentage points. In Model 2 the marginal effects demonstrate that being retired raises the probability of reporting a life satisfaction level of 10 by 2%.

Marital Status

Marital status results reveal that married individuals or those in registered partnerships possess greater well-being than those who are widowed, divorced, separated or never married.

Separated individuals are identified as having the lowest levels of well-being, even lower than those divorced or widowed. This is consistent with results found by Helliwell (2003). This finding may reflect that habituation and recovery effects have probably had more time to come into effect for those who are currently divorced than for those who are separated. Most divorces follow separations so that the average divorced person has been either separated or divorced for longer than the average separated person has been separated.

The marginal effects in Table 6.2(a) Model 1 show that being separated decreases the probability of reporting oneself as "very happy" by 11.2%. The marginal effects results in Model 2 depict that being separated reduces the probability by 4.6 percentage points of stating the highest life satisfaction level. In Model 1 the marginal effects show that being divorced decreases the probability of reporting oneself as "very happy" by 9.7 percentage points. In Model 2 the marginal effects illustrate that being divorced lowers the probability of reporting a life satisfaction level of 10 by 3.2%.

Religion

The explanatory variable describing how important religion is in people's lives illustrates a positive relationship between well-being and religion. Here the parameter estimates are compared to the base case, individuals who report religion as being "quite important". Those who claim religion as "very important" report the highest well-being levels *ceteris paribus.* This is confirmed by the positive statistically significant coefficient on "Relvimp" in Model 1 and Model 2.

The marginal effects in Table 6.2(a) Model 1 show that reporting religion as "very important" increases the probability of being "very happy" by 3.9%. Individuals who state religion as "not at all important" in their lives are 2.9 percentage points less likely to be "very happy". In Model 2 the marginal effects illustrate that reporting religion as "very important" increases the probability of enjoying the highest life satisfaction category by 2 percentage points. Individuals who state religion as "not at all important" in their lives are 1.5 percentage points less likely to state the highest life satisfaction level.

The results depict that the less religious individuals claim to be the greater the negative effect on well-being. These findings are consistent with economic literature which reveals that belief's affect individual well-being. Religious individuals (irrespective of faith) possess greater well-being than non-believers (Clark & Lelkes, 2005). Literature has found this positive effect to result from both the comfort provided by religious beliefs and from the social networks obtained by regular participation in church activities. Helliwell (2003) finds that both the comfort and social network variables are positively related to overall life satisfaction. Individuals who report that God is very important in their lives report an average 0.34 higher life satisfaction measure (Helliwell, 2003). Other studies which find a positive well-being-religion relationship include Clark and Lelkes (2005), Helliwell and Putnam (2004) and Rehdanz and Maddison (2005).

Age

There is a non-linear well-being effect on age. Indeed, the well-being-age effect seems to be U shaped with individuals in their late 40s to early 50s possessing the least well-being.

Previous findings also report a u-shaped relationship between age and well-being where individuals of around 35-45 years old possess the lowest well-being levels (Clark & Oswald, 1994; Gerdtham & Johannesson, 2001; Winkelmann, 2005). Thus, well-being decreases until approximately 40 years of age after which an increase occurs.

Table 6.2: The Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - All European Citizens

Variable Name	Happiness Coefficient and Z-Stat at the 95% Confidence Interval (1)	Life Sat Coefficient and Z-Stat at the 95% Confidence Interval (2)
Gini	-0.012*** (-6.44)	-0.026*** (-16.7)
logGDP	0.405*** (19.64)	0.137*** (7.6)
logAbsolutincome	0.142*** (15.11)	0.143*** (17.22)
Age15to25	0.303*** (9.94)	0.167*** (6.31)
Age26to35	0.137*** (6.07)	0.042** (2.14)
Age46to55	-0.055*** (-2.63)	0.030 (1.64)
Age56to65	0.016 (0.68)	0.105*** (5)
Age66to75	0.022 (0.72)	0.109*** (4)
Age76plus	0.169*** (4.68)	0.206*** (6.43)
Relvimp	0.135*** (7.31)	0.117*** (7.23)
Relnimp	-0.036** (-2.14)	-0.056*** (-3.8)
Relnalimp	-0.105*** (-5.76)	-0.090*** (-5.62)
Healthvgood	0.566*** (32.54)	0.015 (0)
Healthfair	-0.431*** (-26.06)	-0.353*** (-24.44)
Healthpoor	-1.011*** (-39.21)	-0.921*** (-40.02)
Healthvpoor	-1.560*** (-31.59)	-1.338*** (-29.54)
Jobdissatisfied	-0.519*** (-6.85)	-0.733*** (-10.7)
Jobsatisfied2	-0.508*** (-6.23)	-0.880*** (-11.99)
Jobsatisfied3	-0.340*** (-6.13)	-0.683*** (-13.95)
Jobsatisfied4	-0.386*** (-7.68)	-0.629*** (-14.18)
Jobsatisfied5	-0.247*** (-7.22)	-0.496*** (-16.62)
Jobsatisfied6	-0.174*** (-5.36)	-0.303*** (-10.76)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 6.2 continued: The Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - All European Citizens

Variable Name	Happiness Coefficient and Z-Stat at the 95% Confidence Interval (1)	Life Sat Coefficient and Z-Stat at the 95% Confidence Interval (2)
Jobsatisfied7	-0.089*** (-3.51)	-0.185*** (-8.37)
Jobsatisfied9	0.210*** (8.04)	0.240*** (10.62)
Jobsatisfied	0.313*** (11.62)	0.576*** (24.06)
Male	-0.069*** (-5.1)	-0.063*** (-5.31)
RegisteredPartnership	0.110*** (2.65)	-0.020 (-0.57)
Widowed	-0.489*** (-20.39)	-0.266*** (-12.47)
Divorced	-0.398*** (-16.71)	-0.218*** (-10.37)
Separated	-0.495*** (-10.33)	-0.346*** (-8.16)
NeverMarried	-0.325*** (-16.37)	-0.177*** (-10.2)
EmpL30	0.083*** (2.94)	0.006 (0.24)
EmpSelf	0.005 (0.15)	-0.012 (-0.46)
Military	0.221 (0.84)	-0.160 (-0.73)
EmpRetired	0.082*** (3)	0.116*** (4.79)
EmpHousewife	0.047 (1.54)	0.024 (0.9)
EmpStudent	-0.002 (-0.05)	0.036 (1.05)
EmpUnemployed	-0.315*** (-9.94)	-0.451*** (-16.01)
EmpDisability	0.071 (1.47)	-0.114*** (-2.64)
EmpOther	-0.033 (-0.46)	-0.039 (-0.62)
Model Summary		
Observations	34791	34924
LR chi2	11448.47	10663.89
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1624	0.0747
Log likelihood	-29527.368	-66018.775

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 6.2(a): Marginal Effects of the Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - All European Citizens

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
Gini	-0.003*** (-6.44)	-0.004*** (-16.49)
logGDP	0.115*** (19.61)	0.023*** (7.58)
logAbsolutincome	0.403*** (15.09)	0.024*** (16.96)
Age15to25	0.094*** (9.17)	0.030*** (5.81)
Age26to35	0.040*** (5.86)	0.007** (2.1)
Age46to55	-0.015*** (-2.67)	0.005 (1.62)
Age56to65	0.005 (0.68)	0.018*** (4.78)
Age66to75	0.006 (0.72)	0.019*** (3.8)
Age76plus	0.051*** (4.45)	0.038*** (5.78)
Relvimp	0.039*** (7.09)	0.020*** (6.9)
Relnimp	-0.010** (-2.16)	-0.009*** (-3.85)
Relnalimp	-0.029*** (-5.91)	-0.015*** (-5.81)
Healthvgood	0.179*** (29.82)	0.071*** (21.8)
Healthfair	-0.111*** (-28.69)	-0.053*** (-26.23)
Healthpoor	-0.189*** (-62.34)	-0.091*** (-53.54)
Healthvpoor	-0.202*** (-80.47)	-0.093*** (-58.13)
Jobdissatisfied	-0.115*** (-9.34)	-0.074*** (-20.74)
Jobsatisfied2	-0.114*** (-8.43)	-0.080*** (-27.35)
Jobsatisfied3	-0.083*** (-7.32)	-0.072*** (-24.63)
Jobsatisfied4	-0.092*** (-9.43)	-0.069*** (-23.51)
Jobsatisfied5	-0.063*** (-8.08)	-0.060*** (-23.31)
Jobsatisfied6	-0.046*** (-5.77)	-0.042*** (-13.16)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 6.2(a) continued: Marginal Effects of the Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - All European Citizens

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
Jobsatisfied7	-0.025*** (-3.62)	-0.028*** (-9.29)
Jobsatisfied9	0.064*** (7.58)	0.045*** (9.44)
Jobsatisfied	0.098*** (10.72)	0.128*** (19)
Male	-0.020*** (-5.12)	-0.010*** (-5.32)
RegisteredPartnership	0.032** (2.55)	-0.003 (-0.58)
Widowed	-0.116*** (-24.94)	-0.038*** (-14.33)
Divorced	-0.097*** (-19.85)	-0.032*** (-11.74)
Separated	-0.112*** (-13.66)	-0.046*** (-10.58)
NeverMarried	-0.085*** (-17.75)	-0.028*** (-10.82)
EmpL30	0.024*** (2.86)	0.001 (0.24)
EmpSelf	0.001 (0.15)	-0.002 (-0.47)
Military	0.068 (0.78)	-0.024 (-0.82)
EmpRetired	0.024*** (2.95)	0.020*** (4.61)
EmpHousewife	0.014 (1.52)	0.004 (0.89)
EmpStudent	-0.001 (-0.05)	0.006 (1.03)
EmpUnemployed	-0.079*** (-11.49)	-0.057*** (-21.44)
EmpDisability	0.021 (1.43)	-0.018*** (-2.85)
EmpOther	-0.009 (-0.46)	-0.006 (-0.63)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

6.3: Effect of Income Inequality on Poor Individuals

Table 6.3 examines if national income inequality affects poor individual's well-being in Europe. Poor individuals are defined as those with annual household income of below $15,000 (Layard, 2003). Model 1 and Model 2 display regression results for both the happiness and life satisfaction regressions[6.3]. Results illustrate a highly significant negative relationship between well-being and national income inequality. Consequently, poor individuals who are residents of nations characterised with high income inequality report lower levels of well-being than poor individuals living in nations with low income inequality. Indeed Table 6.3(a) Model 1 reports a 0.2% reduction in the likelihood of poor individuals stating "very happy" as their well-being status when a rise in income inequality occurs. Alternatively, if income inequality increases, the probability of poor individuals reporting a 10 on the life satisfaction scale decreases by 0.3%.

Additional explanatory variable coefficients, in Table 6.3 Model 1 and Model 2 do not present much discrepancy from past economic literature. Results demonstrate a positive relationship between aggregate well-being levels and GDP per capita. Thus, poor individuals, who are residents of nations with high GDP per capita, report greater levels of well-being than poor individuals living in nations with low GDP per capita. Advanced absolute income causes the poor to report higher well-being, as the happiness and life satisfaction coefficient on log-absolute-income illustrates. Being unemployed lowers the well-being of the poor. Marital status results demonstrate that poor individuals who are married possess greater well-being than those who are widowed, divorced, separated or have never married. Higher job satisfaction and good health grants greater well-being for the poor. There is a non-linear well-being effect of age. The well-being-age effect appears to be U shaped. Poor individuals in their late 40s to early 50s report the lowest well-being. Lastly, poor women claim greater well-being than poor men, and the more religious a poor individual is the higher their reported well-being is.

[6.3] Model 1 is an ordered probit regression estimating the happiness-income-inequality gradient for poor European citizens where several personal and socio-economic independent variables are included.
Model 2 is an ordered probit regression estimating the life-satisfaction-income-inequality gradient for poor European citizens where several personal and socio-economic independent variables are included.

Table 6.3: The Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Poor European Citizens

Variable Name	Happiness Coefficient and Z-Stat at the 95% Confidence Interval (1)	Life Sat Coefficient and Z-Stat at the 95% Confidence Interval (2)
Gini	-0.012*** (-4.67)	-0.020*** (-8.4)
logGDP	0.375*** (9.69)	0.166*** (4.82)
logAbsolutincome	0.101*** (5.21)	0.095*** (5.45)
Age15to25	0.393*** (7.49)	0.180*** (3.89)
Age26to35	0.176*** (4.02)	0.059 (1.51)
Age46to55	-0.029 (-0.72)	0.040 (1.12)
Age56to65	0.046 (1.08)	0.124*** (3.23)
Age66to75	0.072 (1.45)	0.111** (2.5)
Age76plus	0.156*** (2.87)	0.217*** (4.43)
Relvimp	0.119*** (4.24)	0.124*** (4.93)
Relnimp	-0.058 (-2.04)	-0.097*** (-3.86)
Relnalimp	-0.081** (-2.58)	-0.118*** (-4.19)
Healthvgood	0.536*** (14.54)	0.318*** (9.78)
Healthfair	-0.474*** (-17.85)	-0.351*** (-14.98)
Healthpoor	-1.056*** (-29.68)	-0.929*** (-29.19)
Healthvpoor	-1.610*** (-26.08)	-1.358*** (-24.06)
Jobdissatisfied	-0.410*** (-3.41)	-0.768*** (-6.92)
Jobsatisfied2	-0.712*** (-5.61)	-0.992*** (-8.47)
Jobsatisfied3	-0.393*** (-4.49)	-0.680*** (-8.66)
Jobsatisfied4	-0.268*** (-2.99)	-0.546*** (-6.84)
Jobsatisfied5	-0.183*** (-3.07)	-0.427*** (-8.11)
Jobsatisfied6	-0.100 (-1.61)	-0.179*** (-3.3)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 6.3 continued: The Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Poor European Citizens

Variable Name	Happiness Coefficient and Z-Stat at the 95% Confidence Interval (1)	Life Sat Coefficient and Z-Stat at the 95% Confidence Interval (2)
Jobsatisfied7	0.002 (0.04)	-0.115** (-2.4)
Jobsatisfied9	0.231*** (3.78)	0.253*** (4.69)
Jobsatisfied	0.217*** (4.08)	0.423*** (8.78)
Male	-0.104*** (-4.56)	-0.091*** (-4.47)
RegisteredPartnership	0.080 (0.97)	0.035 (0.48)
Widowed	-0.438*** (-13.77)	-0.203*** (-7.13)
Divorced	-0.393*** (-10.66)	-0.225*** (-6.81)
Separated	-0.369*** (-4.79)	-0.309*** (-4.49)
NeverMarried	-0.329*** (-9.54)	-0.161*** (-5.24)
EmpL30	0.040 (0.7)	-0.002 (-0.03)
EmpSelf	-0.055 (-0.85)	0.013 (0.23)
Military	-0.142 (-0.21)	-0.532 (-0.91)
EmpRetired	0.028 (0.61)	0.029 (0.71)
EmpHousewife	0.000 (0)	-0.063 (-1.31)
EmpStudent	-0.027 (-0.4)	0.063 (1.08)
EmpUnemployed	-0.319*** (-6.78)	-0.464*** (-10.98)
EmpDisability	0.087 (1.26)	-0.094 (-1.51)
EmpOther	-0.158 (-1.39)	-0.205** (-2.03)
Model Summary		
Observations	12115	12176
LR chi2	3436.17	2931.20
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1324	0.0550
Log likelihood	-11255.888	-25195.074

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 6.3(a): Marginal Effects of the Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Poor European Citizens

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
Gini	-0.002*** (-4.66)	-0.003*** (-8.28)
logGDP	0.065*** (9.6)	0.023*** (4.79)
logAbsolutincome	0.017*** (5.2)	0.013*** (5.41)
Age15to25	0.082*** (6.34)	0.027*** (3.52)
Age26to35	0.033*** (3.7)	0.008 (1.46)
Age46to55	-0.005 (-0.73)	0.005 (1.1)
Age56to65	0.008 (1.06)	0.018*** (3.05)
Age66to75	0.013 (1.4)	0.016** (2.38)
Age76plus	0.029*** (2.67)	0.033*** (3.96)
Relvimp	0.021*** (4.08)	0.018*** (4.7)
Relnimp	-0.010** (-2.08)	-0.013*** (-3.99)
Relnalimp	-0.014*** (-2.66)	-0.015*** (-4.42)
Healthvgood	0.118*** (11.85)	0.051*** (8.3)
Healthfair	-0.075*** (-18.54)	-0.044*** (-15.14)
Healthpoor	-0.114*** (-34.63)	-0.080*** (-30.3)
Healthvpoor	-0.105*** (-36.37)	-0.074*** (-31.7)
Jobdissatisfied	-0.054*** (-4.72)	-0.059*** (-14.27)
Jobsatisfied2	-0.076*** (-10.61)	-0.065*** (-21.14)
Jobsatisfied3	-0.052*** (-6.06)	-0.056*** (-15.43)
Jobsatisfied4	-0.039*** (-3.62)	-0.050*** (-10.94)
Jobsatisfied5	-0.028*** (-3.45)	-0.043*** (-11.09)
Jobsatisfied6	-0.016* (-1.71)	-0.021*** (-3.76)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 6.3(a) continued: Marginal Effects of the Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Poor European Citizens

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
Jobsatisfied7	0.000 (0.04)	-0.014** (-2.59)
Jobsatisfied9	0.046*** (3.36)	0.040*** (4.03)
Jobsatisfied	0.042*** (3.67)	0.074*** (7.01)
Male	-0.018*** (-4.6)	-0.012*** (-4.51)
RegisteredPartnership	0.015 (0.93)	0.005 (0.46)
Widowed	-0.065*** (-15.56)	-0.025*** (-7.66)
Divorced	-0.055*** (-13.05)	-0.027*** (-7.71)
Separated	-0.050*** (-6.3)	-0.034*** (-5.75)
NeverMarried	-0.051*** (-10.54)	-0.020*** (-5.55)
EmpL30	0.007 (0.68)	0.000 (-0.03)
EmpSelf	-0.009 (-0.88)	0.002 (0.23)
Military	-0.022 (-0.23)	-0.048 (-1.53)
EmpRetired	0.005 (0.61)	0.004 (0.7)
EmpHousewife	0.000 (0)	-0.008 (-1.36)
EmpStudent	-0.005 (-0.41)	0.009 (1.04)
EmpUnemployed	-0.046*** (-7.99)	-0.047*** (-14.2)
EmpDisability	0.016 (1.2)	-0.012 (-1.62)
EmpOther	-0.025 (-1.55)	-0.024* (-2.39)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

6.4: Effect of Income Inequality on Rich Individuals

Table 6.4 aims to test whether national income inequality affects rich individual's well-being levels in Europe. Rich individuals are defined as those with annual household income in excess of $15,000 (Layard, 2003). Model 1 and Model 2 display regression results for both the happiness and life satisfaction regressions [6.4]. Here results illustrate a highly significant negative relationship between well-being and national income inequality. Therefore, rich individuals living in nations which are characterised with high income inequality report lower levels of well-being than rich individuals living in nations with low income inequality. Indeed Table 6.4(a) Model 2 reports a 0.4% reduction in the likelihood of the rich stating "very happy" as their well-being status when a rise in income inequality occurs. Alternatively, if income inequality increases, the probability of rich individuals reporting a 10 on the life satisfaction scale decreases by 0.7%.

The coefficients of the additional explanatory variables, in Table 6.4 Model 1 and Model 2 do not present much variation from previous economic literature. Results show a positive relationship between aggregate well-being levels and GDP per capita. Therefore, rich individuals living in nations with greater GDP per capita report higher levels of well-being than rich individuals living in nations with lower GDP per capita. Higher absolute income results in greater reported well-being for the rich, as the happiness and life satisfaction coefficients on log-absolute-income reveal. Being unemployed reduces the well-being of the rich. Marital status results demonstrate that married rich individuals possess greater well-being than those who are widowed, divorced, separated or have never married. Higher job satisfaction and good health results in greater well-being for the rich. There is a non-linear well-being effect of age. The well-being-age effect seems to be U shaped with rich individuals in their late 40s to early 50s possessing the least well-being. Rich women report greater well-being than rich men. Finally, the more religious a rich individual is the higher their reported well-being is.

[6.4] Model 1 is an ordered probit regression estimating the happiness-income-inequality gradient for rich European citizens where several personal and socio-economic independent variables are included.
Model 2 is an ordered probit regression estimating the life-satisfaction-income-inequality gradient for rich European citizens where several personal and socio-economic independent variables are included.
These results are consistent with previous economic literature. This includes literature on absolute income (Ferrer-i-Carbonell, 2005), GDP (Easterlin, 1995; 2001; Di Tella *et al.*,

1999; Frey & Sutzer, 2000a; Inglehart, 2000), health (Lelkes, 2006a; Gerdtham & Johannesson, 2001; Clark & Oswald, 1994; Dolan *et al*., 2008), religion (Helliwell, 2003; Clark & Lelkes, 2005), gender (Alesina *et al.,* 2004), age (Easterlin, 2006), marriage (Helliwell, 2003; Clark & Oswald, 1994), job satisfaction (Clark & Oswald, 1996) and unemployment (Stutzer, 2004; Di Tella *et al*., 2001; Frey & Stutzer, 2000a; Clark & Oswald, 1994; Helliwell, 2003).

Table 6.4: The Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Rich European Citizens

Variable Name	Happiness Coefficient and Z-Stat at the 95% Confidence Interval (1)	Life Sat Coefficient and Z-Stat at the 95% Confidence Interval (2)
Gini	-0.012*** (-4.64)	-0.034*** (-15.39)
logGDP	0.401*** (15.85)	0.096*** (4.43)
logAbsolutincome	0.132*** (7.77)	0.146*** (9.91)
Age15to25	0.249*** (6.59)	0.162*** (4.95)
Age26to35	0.122*** (4.61)	0.039* (1.7)
Age46to55	-0.066*** (-2.65)	0.023 (1.08)
Age56to65	0.003 (0.09)	0.092*** (3.65)
Age66to75	-0.010 (-0.25)	0.112*** (3.14)
Age76plus	0.234*** (4.48)	0.203*** (4.44)
Relvimp	0.146*** (5.94)	0.103*** (4.81)
Relnimp	-0.022 (-1.07)	-0.033* (-1.81)
Relnalimp	-0.116*** (-5.11)	-0.081*** (-4.12)
Healthvgood	0.585*** (29.38)	0.407*** (23.78)
Healthfair	-0.399*** (-18.68)	-0.350*** (-18.92)
Healthpoor	-0.929*** (-23.18)	-0.846*** (-23.78)
Healthvpoor	-1.454*** (-16.81)	-1.206*** (-15.15)
Jobdissatisfied	-0.600*** (-6.13)	-0.741*** (-8.46)
Jobsatisfied2	-0.364*** (-3.39)	-0.826*** (-8.73)
Jobsatisfied3	-0.309*** (-4.26)	-0.684*** (-10.83)
Jobsatisfied4	-0.461*** (-7.52)	-0.689*** (-12.88)
Jobsatisfied5	-0.291*** (-6.89)	-0.549*** (-15.04)
Jobsatisfied6	-0.211*** (-5.5)	-0.368*** (-11.11)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 6.4 continued: The Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Rich European Citizens

Variable Name	Happiness Coefficient and Z-Stat at the 95% Confidence Interval (1)	Life Sat Coefficient and Z-Stat at the 95% Confidence Interval (2)
Jobsatisfied7	-0.119*** (-4.1)	-0.217*** (-8.68)
Jobsatisfied9	0.209*** (7.18)	0.250*** (10)
Jobsatisfied	0.346*** (11)	0.638*** (23.01)
Male	-0.054*** (-3.14)	-0.051*** (-3.48)
RegisteredPartnership	0.128*** (2.68)	-0.037 (-0.91)
Widowed	-0.528*** (-13.47)	-0.329*** (-9.49)
Divorced	-0.395*** (-12.39)	-0.199*** (-7.15)
Separated	-0.582*** (-9.46)	-0.373*** (-6.88)
NeverMarried	-0.317*** (-12.92)	-0.185*** (-8.72)
EmpL30	0.105*** (3.2)	.020 (0.72)
EmpSelf	0.020 (0.58)	-0.027 (-0.91)
Military	0.304 (1.06)	-0.080 (-0.34)
EmpRetired	0.127*** (3.54)	0.184*** (5.93)
EmpHousewife	0.061 (1.62)	0.066** (2.02)
EmpStudent	-0.001 (-0.03)	-0.003 (-0.07)
EmpUnemployed	-0.326*** (-6.82)	-0.434*** (-10.4)
EmpDisability	0.035 (0.49)	-0.166*** (-2.66)
EmpOther	0.052 (0.54)	0.081 (0.98)
Model Summary		
Observations	22676	22748
LR chi2	5211.55	5788.72
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1254	0.0668
Log likelihood	-18182.188	-40460.717

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 6.4(a): Marginal Effects of the Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Rich European Citizens

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
Gini	-0.004*** (-4.64)	-0.007*** (-15.22)
logGDP	0.136*** (15.85)	0.018*** (4.3)
logAbsolutincome	0.045*** (7.77)	0.028*** (9.88)
Age15to25	0.089*** (6.31)	0.034** (4.57)
Age26to35	0.042*** (4.53)	0.008* (1.68)
Age46to55	-0.022*** (-2.68)	0.005 (1.07)
Age56to65	0.001 (0.09)	0.018*** (3.48)
Age66to75	-0.003 (-0.25)	0.023*** (2.96)
Age76plus	0.084*** (4.29)	0.044*** (4.01)
Relvimp	0.051*** (5.81)	0.021*** (4.62)
Relnimp	-0.008 (-1.07)	-0.006* (-1.81)
Relnalimp	-0.039*** (-5.21)	-0.015*** (-4.21)
Healthvgood	0.209*** (28.44)	0.087*** (21.26)
Healthfair	-0.126*** (-20.4)	-0.060*** (-20.88)
Healthpoor	-0.227*** (-37.17)	-0.100*** (-38.12)
Healthvpoor	-0.267*** (-49.51)	-0.108*** (-40.48)
Jobdissatisfied	-0.164*** (-8.22)	-0.089*** (-15.94)
Jobsatisfied2	-0.110*** (-3.94)	-0.094*** (-18.16)
Jobsatisfied3	-0.095*** (-4.79)	-0.086*** (-18.61)
Jobsatisfied4	-0.134*** (-9.15)	-0.087*** (-21.68)
Jobsatisfied5	-0.091*** (-7.61)	-0.077*** (-21.25)
Jobsatisfied6	-0.068*** (-5.87)	-0.058*** (-13.84)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 6.4 (a) continued: Marginal Effects of the Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Rich European Citizens

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
Jobsatisfied7	-0.039*** (-4.22)	-0.038*** (-9.6)
Jobsatisfied9	0.074*** (6.94)	0.054*** (9.05)
Jobsatisfied	0.126*** (10.48)	0.162*** (18.65)
Male	-0.018*** (-3.14)	-0.009*** (-3.27)
RegisteredPartnership	0.045*** (2.61)	-0.007 (-0.92)
Widowed	-0.152*** (-16.69)	-0.053*** (-11.57)
Divorced	-0.120*** (-14.2)	-0.034*** (-7.92)
Separated	-0.162*** (-12.42)	-0.057*** (-8.94)
NeverMarried	-0.102*** (-13.75)	-0.034*** (-9.21)
EmpL30	0.036*** (3.13)	0.004 (0.71)
EmpSelf	0.007 (0.58)	-0.005 (-0.84)
Military	0.111 (1.01)	-0.014 (-0.34)
EmpRetired	0.044*** (3.48)	0.039*** (5.59)
EmpHousewife	0.021 (1.6)	0.014** (2.04)
EmpStudent	0.000 (-0.03)	0.000 (0)
EmpUnemployed	-0.100*** (-7.67)	-0.065*** (-13.68)
EmpDisability	0.012 (0.49)	-0.029*** (-2.89)
EmpOther	0.018 (0.53)	0.017 (0.97)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

6.5: Difference Between Rich and Poor Individual Results

The second hypotheses of this chapter tests whether the well-being-income-inequality relationship determined for low income individuals differ from that determined for high income individuals. In Table 6.3 and Table 6.4 respondents are divided into poor and rich sub-samples. An individual is defined as "rich" if he/she reports an annual household income in excess of $15,000. An individual is defined as "poor" if he/she reports an annual household income of less than $15,000. This chapter finds specific variances, within an overall context of significant similarity, when comparing results of the two sub-samples.

Results for Table 6.3(a) and Table 6.4(a) depict that while the poor and rich display a negative statistically significant coefficient on income inequality, the rich coefficient is larger than the poor coefficient. Thus, the happiness and life satisfaction of rich individual's is more negatively affected by income inequality than poor individual's.

The marginal effects in Table 6.4(a) Model 1 reports a 0.4% reduction in the likelihood of the rich stating "very happy" as their well-being status when a rise in income inequality occurs. This is compared to Table 6.3(a) Model 1 where results show a 0.2% reduction in the likelihood of poor individuals stating "very happy". Alternatively in Model 2, if income inequality increases, the probability of rich individuals reporting a 10 on the life satisfaction scale decreases by 0.7% whereas the probability of poor individuals reporting a 10 on the life satisfaction scale decreases by 0.3%.

The coefficients of the additional explanatory variables illustrate that absolute income, age, religion, health, job satisfaction, marital status and being unemployed all have a higher effect on the well-being of the rich then the poor. The gender coefficient has a larger effect on the well-being of the poor than the rich.

The results of this chapter highlight the importance of income redistribution in European nations. Happiness is considered as an ultimate goal of life (Frey & Stutzer, 2002a). Therefore, this thesis suggests government policy to shift their primary focus towards maximizing aggregate well-being. In order to achieve the maximisation of aggregate well-being in Europe, this thesis suggests government policy to account for the negative

effect of income inequality on well-being. This chapter highlights the importance of income redistribution policies in order to maximize aggregate well-being levels in Europe.

6.6: Difference Between Life Satisfaction and Happiness Results

Many studies, despite having two distinct meanings, use the term happiness and life satisfaction interchangeably (Gerdtham & Johannesson, 2001; Frey & Stutzer, 2000a; Ferrer-i-Carbonell, 2005). The third hypotheses of this chapter identifies whether the effect of income-inequality on well-being is affected by the different definitions of well-being, namely that of happiness and life satisfaction. This thesis defines happiness and life satisfaction similar to the definitions used by Helliwell and Putnam (2004). Life satisfaction data was derived from the following EVS question: "*How satisfied are you with your life?"* Interviewees ranked their responses on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). This refers to the overall cognitive evaluation of an individual's own life. Happiness data was derived from the EVS question which reads as follows: *"All things together how happy are you?*" Interviewees ranked their responses on an ordered scale, with the options of choosing "not at all happy", "not very happy", "quite happy" or "very happy". This refers to immediate positive or negative emotions experienced by an individual when considering all aspects of their life.

The subjective well-being data does not have a natural scale (Sacks *et al.,* 2010). The two well-being measures that are considered are life satisfaction measured on a 10-point scale and happiness measured on a four-point scale. Thus, a discrepancy in the scale occurs. In order to make the coefficients from survey linear estimation on the 10-point life satisfaction equation more easily comparable with those from the 4-point happiness equation Table 6.6 collapses the life satisfaction data into a 4-point scale.

Similar to that done in Kapferer *et al*., (2012) the measure of life satisfaction labelled as "very satisfied" includes all respondents who ranked their life satisfaction with scores of 9 or 10. Correspondingly those who report a life satisfaction score of 1 or 2 are stated as being "not at all satisfied". Life satisfaction 3, 4 and 5 are collapsed and categorised as "not very satisfied". Likewise, individuals who are "quite satisfied" are referred to as having a life satisfaction score of 6, 7 or 8. Table 6.6, using an ordered probit model, tests whether income inequality results in a negative effect on individual well-being when happiness and life satisfaction are both measured on a 4-point scale.

When comparing the life satisfaction and happiness results this chapter identifies specific variances, within a general framework of significant resemblance. When accounting for all respondents, in Table 6.6(a) income inequality has a larger negative effect on life satisfaction than on happiness. Table 6.6(a) Model 1 reports a 0.3% reduction in the likelihood of individuals stating "very happy" as their well-being status when a rise in income inequality occurs. This is compared to Table 6.6(a) Model 2 where results show a 0.8% reduction in the likelihood of individuals stating "very satisfied" when an increase in income inequality arises. Therefore, income inequality may be seen to affect an individual's overall evaluation of their life to a greater extent than an individual's immediate positive or negative emotions.

The marginal effects in Table 6.6(a) illustrate that the job satisfaction, retirement, unemployment and gender coefficients have a larger effect on life satisfaction then on happiness. Being unemployed decreases the probability of reporting oneself as "very happy" by 7.9 percentage points. This is compared to a 12.4 percentage point reduction in the probability of reporting the highest life satisfaction level. Being retired lowers the likelihood of reporting oneself as "very happy" by 2.4% and "very satisfied" by 3.5%. Being male reduces the probability of enjoying the highest happiness level by 2 percentage points and the highest life satisfaction level by 2.3 percentage points. All job satisfaction dummies report larger effects on life satisfaction then on happiness. For example respondents who are dissatisfied with their job reduce the probability of reporting themselves as "very happy" by 11.5%. This is compared to an 18.3% reduction in the probability of reporting oneself as "very satisfied". Likewise individuals who are satisfied with their job increase the probability of reporting themselves as "very happy" by 9.8 percentage points. This is compared to a 17.8 percentage point increase in the probability of reporting the highest life satisfaction level.

Findings in Table 6.6(a) Model 1 and Model 2 depict that national income, absolute household income and marital status have a larger impact on happiness then on life satisfaction. The marginal effects in Table 6.6(a) Model 1 and Model 2 show that an increase in absolute income raises the probability of reporting oneself as "very happy" by 40.3% compared with the probability of 5% of reporting "very satisfied". Results illustrate that an increase in national income raises the possibility of recording oneself as

"very happy" by 11.5% likened with the increased probability of 4.4% of stating the highest life satisfaction category.

Reporting a marital status of "widowed" reduces the probability of reporting oneself as "very happy" by 11.6%. Being widowed lowers the likelihood of possessing the highest life satisfaction by 7.8%. The probability of stating oneself as "very happy" is 9.7% lower if one is divorced. Reporting oneself as divorced decreases the probability of being "very satisfied" by 6.1%. Individuals who are separated possess a 11.2 reduced probability of reporting the highest happiness level. This is compared to a 9.3 reduced probability of recording the highest life satisfaction level. Reporting a marital status of "never married"

Table 6.6: The Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Happiness and Life Satisfaction on a 4-Point Scale

Variable Name	Happiness Coefficient and Z-Stat at the 95% Confidence Interval (1)	Life Sat Coefficient and Z-Stat at the 95% Confidence Interval (2)
Gini	-0.012*** (-6.44)	-0.025*** (-14.23)
logGDP	0.405*** (19.64)	0.136*** (6.91)
logAbsolutincome	0.142*** (15.11)	0.155*** (17.23)
Age15to25	0.303*** (9.94)	0.170*** (5.85)
Age26to35	0.137*** (6.07)	0.042* (1.95)
Age46to55	-0.055*** (-2.63)	0.028 (1.38)
Age56to65	0.016 (0.68)	0.089*** (3.9)
Age66to75	0.022 (0.72)	0.098*** (3.31)
Age76plus	0.169*** (4.68)	0.182*** (5.24)
Relvimp	0.135*** (7.31)	0.101*** (5.73)
Relnimp	-0.036** (-2.14)	-0.044*** (-2.75)
Relnalimp	-0.105*** (-5.76)	-0.085*** (-4.83)
Healthvgood	0.566*** (32.54)	0.383*** (23.02)
Healthfair	-0.431*** (-26.06)	-0.352*** (-22.54)
Healthpoor	-1.011*** (-39.21)	-0.897*** (-36.37)
Healthvpoor	-1.560*** (-31.59)	-1.341*** (-27.88)
Jobdissatisfied	-0.519*** (-6.85)	-0.792*** (-10.89)
Jobsatisfied2	-0.508*** (-6.23)	-0.819*** (-10.43)
Jobsatisfied3	-0.340*** (-6.13)	-0.630*** (-12.01)
Jobsatisfied4	-0.386*** (-7.68)	-0.608*** (-12.79)
Jobsatisfied5	-0.247*** (-7.22)	-0.499*** (-15.52)
Jobsatisfied6	-0.174*** (-5.36)	-0.263*** (-8.58)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on a four point scale from 1 (dissatisfied) to 4 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 6.6 continued: The Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Happiness and Life Satisfaction on a 4-Point Scale

Variable Name	Happiness Coefficient and Z-Stat at the 95% Confidence Interval (1)	Life Sat Coefficient and Z-Stat at the 95% Confidence Interval (2)
Jobsatisfied7	-0.089*** (-3.51)	-0.169*** (-7.01)
Jobsatisfied9	0.210*** (8.04)	0.318*** (12.59)
Jobsatisfied	0.313*** (11.62)	0.496*** (18.75)
Male	-0.069*** (-5.1)	-0.070*** (-5.4)
RegisteredPartnership	0.110*** (2.65)	0.005 (0.12)
Widowed	-0.489*** (-20.39)	-0.261*** (-11.34)
Divorced	-0.398*** (-16.71)	-0.200*** (-8.74)
Separated	-0.495*** (-10.33)	-0.327*** (-7.12)
NeverMarried	-0.325*** (-16.37)	-0.172*** (-9.08)
EmpL30	0.083*** (2.94)	0.005 (0.2)
EmpSelf	0.005 (0.15)	-0.023 (-0.79)
Military	0.221 (0.84)	-0.134 (-0.56)
EmpRetired	0.082*** (3)	0.108*** (4.09)
EmpHousewife	0.047 (1.54)	0.013 (0.44)
EmpStudent	-0.002 (-0.05)	0.050 (1.33)
EmpUnemployed	-0.315*** (-9.94)	-0.449*** (-14.81)
EmpDisability	0.071 (1.47)	-0.139*** (-2.99)
EmpOther	-0.033 (-0.46)	0.030 (-0.29)
Model Summary		
Observations	34791	34924
LR chi2	11448.47	9288.48
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1624	0.1166
Log likelihood	-29527.368	-35200.23

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on a four point scale from 1 (dissatisfied) to 4 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 6.6(a): Marginal Effects of the Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Happiness and Life Satisfaction on a 4-Point Scale

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
Gini	-0.003*** (-6.44)	-0.008*** (-14.22)
logGDP	0.115*** (19.61)	0.044*** (6.91)
logAbsolutincome	0.403*** (15.09)	0.050*** (17.21)
Age15to25	0.094*** (9.17)	0.057*** (5.63)
Age26to35	0.040*** (5.86)	0.014* (1.94)
Age46to55	-0.015*** (-2.67)	0.009 (1.37)
Age56to65	0.005 (0.68)	0.029*** (3.83)
Age66to75	0.006 (0.72)	0.032*** (3.24)
Age76plus	0.051*** (4.45)	0.061*** (5.03)
Relvimp	0.039*** (7.09)	0.033*** (5.62)
Relnimp	-0.010** (-2.16)	-0.014*** (-2.77)
Relnalimp	-0.029*** (-5.91)	-0.027*** (-4.92)
Healthvgood	0.179*** (29.82)	0.131*** (21.9)
Healthfair	-0.111*** (-28.69)	-0.107*** (-24.07)
Healthpoor	-0.189*** (-62.34)	-0.210*** (-54.09)
Healthvpoor	-0.202*** (-80.47)	-0.239*** (-68.22)
Jobdissatisfied	-0.115*** (-9.34)	-0.183*** (-17.6)
Jobsatisfied2	-0.114*** (-8.43)	-0.187*** (-17.33)
Jobsatisfied3	-0.083*** (-7.32)	-0.158*** (-16.84)
Jobsatisfied4	-0.092*** (-9.43)	-0.154*** (-17.57)
Jobsatisfied5	-0.063*** (-8.08)	-0.134*** (-19.42)
Jobsatisfied6	-0.046*** (-5.77)	-0.077*** (-9.47)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on a four point scale from 1 (dissatisfied) to 4 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table 6.6(a) continued: Marginal Effects of the Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Happiness and Life Satisfaction on a 4-Point Scale

Variable Name	Happiness Marginal Effects dy/dx and Z-Stat (1)	Life Sat Marginal Effects dy/dx and Z-Stat (2)
Jobsatisfied7	-0.025*** (-3.62)	-0.052*** (-7.39)
Jobsatisfied9	0.064*** (7.58)	0.110*** (11.85)
Jobsatisfied	0.098*** (10.72)	0.178*** (17.42)
Male	-0.020*** (-5.12)	-0.023*** (-5.42)
RegisteredPartnership	0.032** (2.55)	0.001 (0.12)
Widowed	-0.116*** (-24.94)	-0.078*** (-12.3)
Divorced	-0.097*** (-19.85)	-0.061*** (-9.32)
Separated	-0.112*** (-13.66)	-0.093*** (-8.18)
NeverMarried	-0.085*** (-17.75)	-0.054*** (-9.39)
EmpL30	0.024*** (2.86)	0.002 (0.2)
EmpSelf	0.001 (0.15)	-0.007 (-0.8)
Military	0.068 (0.78)	-0.041 (-0.59)
EmpRetired	0.024*** (2.95)	0.035*** (4.03)
EmpHousewife	0.014 (1.52)	0.004 (0.43)
EmpStudent	-0.001 (-0.05)	0.016 (1.32)
EmpUnemployed	-0.079*** (-11.49)	-0.124*** (-17.89)
EmpDisability	0.021 (1.43)	-0.043*** (-3.14)
EmpOther	-0.009 (-0.46)	-0.006 (-0.29)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on a four point scale from 1 (dissatisfied) to 4 (satisfied). Significance levels: ***1%, **5%, *10%)*

6.7: Post Estimation Diagnostics

The Likelihood Ratio Chi-Square (LR chi2) tests that at least one of the predictor's regression coefficient is not equal to zero (Syafitri, 2013). The likelihood ratio chi-square, for all regressions in this chapter, are between 2931.20 and 11448.47. All regressions have a Prob > chi2 (p-value) of 0.00. These results indicate that the models used in this chapter are statistically significant at the 99% confidence interval. For OLS and probit estimations, Pseudo R-squared may be used when measuring the strength of the association between the dependent and predictor variables (Syafitri, 2013). The pseudo-R squared values, for regressions incorporated in this chapter, are between 0.055 and 0.162. This is in accordance with the usual finding in the literature that approximately 20% or less of individual well-being depends on objective variables such as income, age, education and marital status (Kahneman *et al.*, 1999). Thus, well-being regressions characteristically yield low r-squares indicating the extent to which emotions and various alternative components of well-being are influencing the result instead of the variables researchers are able to measure (Graham, 2008).

A Wald test is performed on the cut-off points displayed in Table A6.2, Table A6.3, Table A6.4 and Table A6.6 in the appendix. The Wald Test is used to test the joint significance of a subset of coefficients. For all regressions in this chapter the null hypothesis that the cut-offs are jointly equal to zero is rejected at the 1% significance level.

6.8: Chapter Conclusion

This chapter presents an empirical analysis of the effect of income inequality on European resident's well-being levels. Three variations of the hypothesis are tested: Firstly, whether income inequality affects aggregate national well-being levels; Secondly, whether the well-being-income-inequality relationship determined for low income individuals differ from that determined for high income individuals; And lastly, whether the effect of income inequality on well-being is affected by the different definitions of well-being. The empirical assessment is estimated by applying the ordered probit technique to cross sectional data of European residents obtained from the 2008 wave of the EVS. National inequality levels are measured by the Gini coefficient obtained from Eurostat data.

Globalization and market capitalism have increased inequality within most nations (Freeman, 2011). This chapter verifies that an increase in income inequality results in a decline in average well-being levels whether the full sample, rich sample or poor sample is analysed. Therefore, the results of this chapter conform with Runciman's relative deprivation theory which predicts that growth in income inequality will result in a rise in relative deprivation and a fall in individual well-being. This finding may explain Easterlin's (1974) claim that average reported well-being do not have a strong correlation with average levels of national income.

When estimating the well-being-income-inequality gradient for both rich and poor respondents, with a cut-off level of annual household income of $15,000, results show a highly statistically significant negative relationship. Therefore, irrespective of whether an individual is rich or poor, living in a nation which is characterised with high income inequality reduces well-being levels in Europe. Indeed when comparing poor and rich results the rich coefficient is larger than the poor coefficient. Thus, rich individuals are more negatively affected by income inequality than poor individuals.

When comparing the life satisfaction and happiness results this chapter finds specific variances within an overall context of significant similarity. Therefore, this chapter ascertains that a slight difference in results occurs when using happiness or life satisfaction as the indicator of well-being. Primarily, when accounting for all, rich or poor respondents, income inequality has a larger negative effect on life satisfaction than on

happiness. Therefore, income inequality may be seen to affect an individual's overall evaluation of their life to a greater extent than an individual's immediate positive or negative emotions.

The coefficients of the additional explanatory variables are similar to those presented in previous economic literature. Results display a positive relationship between aggregate well-being levels and GDP per capita. Therefore, individuals living in nations with greater GDP per capita report higher levels of well-being than individuals living in lower GDP per capita nations. Higher absolute income results in greater reported well-being, as the happiness and life satisfaction coefficients on log-absolute-income illustrate. Thus, richer individuals, *ceteris paribus*, report higher levels of well-being than fellow-citizens at the bottom of the income distribution.

Being unemployed reduces well-being. The retired report greater well-being than respondents with paid employment of 30 hours a week or more. Marital status results demonstrate that married individuals possess greater well-being than those who are widowed, divorced, separated or never married. Higher job satisfaction and good health is found to result in greater well-being. There is a non-linear well-being effect on age. Indeed, the well-being-age effect seems to be U shaped with individuals in their late 40s to early 50s possessing the least well-being. Finally, women report greater well-being than men, and the more religious an individual is the higher their reported well-being.

Happiness is considered as an ultimate goal of life (Frey & Stutzer, 2002a). Therefore, this thesis suggests government policy to shift their primary focus towards maximizing aggregate well-being. Doubts have been raised about the benefits to an economy with high rates of GDP growth without at the same time accounting for distributional effects (Angeriz *et al*., 2011). In order to achieve the maximisation of aggregate well-being in Europe this thesis suggests government policy to account for the negative effect of income inequality on well-being. This chapter highlights the importance of policies concerning income redistribution in order to maximize aggregate well-being levels in Europe.

CHAPTER 7
CONCLUSION

This chapter summarises this thesis. This chapter also presents the primary empirical results, policy implications and future research emerging from this research. Economic development has long been believed as an essential goal of economic policy. In recent years however, arguments against further trying to increase material standards of living have emerged.The rational of this thesis stems from the need for reliable research into the relationship between well-being and income. The understanding of the well-being-income relationship is underpinned by a vast quantity of economic literature. Existing research is however, founded on fragile and incomplete evidence (Stevenson & Wolfers, 2008). Economic growth matters only in so far as it increases individual well-being (Oswald, 1997). In order to encourage increases in aggregate national well-being, through effective evidence-based policymaking, academics need to investigate the discordant results of the Easterlin paradox. A clear consensus regarding the well-being-income relationship which may be used when advising governments on effective well-being enhancing policies is provided by this research.

7.1: Chapter Summary

The first chapter introduces this thesis. Chapter 1 outlines the aim and rational of this research. This is followed by an introductory review of the empirical literature, the data and economic techniques used. The contributions of this thesis are also explained.

The aim of this thesis is to explore the possible explanations of the apparent contradictory results provided by Easterlin (1974), by using cross sectional data of European residents obtained from the 2008 wave of the EVS. Easterlin (1974) reports that average national well-being is unrelated to GDP per head while at the micro level, well-being and individual income are positively related. The aim of this thesis is achieved by estimating the well-being-income relationship in many different ways. Firstly, Chapter 4 presents an empirical analysis of the importance of absolute, reference and relative income on individual well-being levels in Ireland. Secondly, Chapter 5 examines the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe. Thirdly, Chapter 6 assesses the effect of income inequality on well-being levels in Europe.

This thesis makes three chief contributions. Firstly, Chapter 4 identifies the significance of individual and peer group income on well-being when explaining the opposing results of the Easterlin paradox. This contributes to the well-being literature as existing studies, regarding the well-being-income relationship, are founded on fragile and incomplete evidence (Stevenson & Wolfers, 2008). Concentrating on 2008 EVS Irish data, when analysing the well-being-income relationship, adds a unique characteristic to the well-being literature. No literature has been identified that exclusively focuses on the Irish component of the EVS 2008 when establishing the relationship between well-being and absolute, reference and relative income. Accounting for reference income also contributes to the importance of this thesis, as few well-being economic empirical analyses account for reference group income.

Secondly a contribution, to existing well-being research, is made by clarifying the existence of a specific income level after which an adjustment in the well-being-income relationship occurs. In an attempt to explain the opposing results of the Easterlin paradox, Chapter 5 of this thesis identifies whether a positive well-being-income relationship

prevails only in low GDP per capita nations. This contributes to existing well-being literature as a clear consensus when regarding the existence or magnitude of the modified Easterlin hypothesis has not been reached. The previous inconsistent results may lead to policies which fail to increase or indeed reduce aggregate well-being levels. This thesis contributes to the evident need for reliable research into the relationship between well-being and income as economic growth matters only in so far as it increases individual well-being (Oswald, 1997).

Through the evaluation of the effect of income inequality on well-being a third contribution to the area of well-being economics is made. Chapter 6 establishes the implication of income inequality on well-being when explaining the conflicting results of the Easterlin paradox. Income inequality remains a contentious area and its effect on individual well-being remains disputed within economic literature (Graham & Felton, 2005). This thesis contributes to the provision of effective well-being enhancing policies as it provides a clear consensus regarding the well-being-income-inequality relationship. Accounting for the alternative definitions of well-being also contributes to the importance of this thesis in the well-being literature. Limited economic empirical work has been completed on whether the effect of income on well-being is affected by the different definitions of well-being and therefore, this thesis contributes significantly to this vastly neglected topic.

Chapter 2 reviews existing empirical literature in the area of well-being and income. Neoclassical economics inferres individual utility, obtained from goods and services, from preferences revealed by the individual's market behaviour (Dolan *et al.*, 2008). In traditional economic models a person's utility is thought to be an increasing function of present and future consumption of goods, leisure and other amenities that is classically viewed as desirable (Frank, 1997). Confronted with limited incomes, individuals are assumed to choose among alternatives so as to maximize ones utility. Utility theory presumes that individuals are rational, fully informed, utility maximising and insatiable consumers. If individuals always favour more over less, then higher income results in higher well-being (Dolan *et al.*, 2008). Thus, neoclassical economists traditionally derive utility purely from absolute income as arbitrated by consumer preferences and choice (Graham, 2005). In other words, the degree of individual preferences that are fulfilled is

directly correlated with individual utility within a rational individual's monetary budget constraint.

According to the utility maximisation principle the best choice is always the one that gives the most utility to the decision maker (Frey & Stutzer, 2000b). This notion beleves that an individual's utility depends on the basket of goods and services consumed and therefore, individuals living in rich, developed nations are happier than individuals in poor developing nations. However, the pioneering study by Easterlin (1974) reveals average levels of happiness as being fairly constant across nations. Thus, individuals living in rich and poor nations report equal happiness levels. This finding has resulted in debates concerning the correlation between well-being and income within economic literature since the 1970s (Ferrer-i-Carbonell, 2005). Literature in the area of behavioural economics has shown that individuals often make decisions that somewhat compromise their own well-being and thus, depart from the standard model of the rational economic agent (Kahneman & Krueger, 2006). If indeed, individuals display limited rationality when maximizing utility, then choices made do not necessarily mirror individual's true preferences. As a result of this, economists have become increasingly apprehensive with regards to the neoclassical preference theory when measuring utility (Frey & Stutzer, 2003).

In the past few years a number of economists deliberated over alternative ways of measuring utility (Dolan *et al.*, 2008). The economics of well-being merges techniques from economics and psychology when evaluating well-being and belives in a more extensive concept of utility than conventional economists (Graham, 2008). The economics of well-being moves away from the "decision utility" approach of revealed preferences and measures well-being as the subjective overall assessment of one's life (Frey & Stutzer, 2000b). In empirical analyses consurning well-being, instead of deriving utility from income and price data, individuals are directly questioned on their life satisfaction or happiness. Research finds that reported subjective well-being is an adequate empirical approximation of individual utility (Frey & Stutzer, 2005). As stated by Frey and Stutzer (2010: 43) "*Utility can and should be cardinally measured in the form of subjective well-being"*.

Easterlin (1974) established the economics of well-being in the 1970s. Well-being focuses on an individual's being (Gasper, 2004). Well-being has been defined as an individual's evaluation of their own life regarded as a whole (Sarracino, 2013). However, no clear consensus as to the definition of well-being has been found. This may be due to happiness and life satisfaction meaning different things to different individuals (Frey & Stutzer, 2003). Helliwell and Putnam (2004) conceptualise happiness as being relatively short-term, situation dependent expressions of mood. Whereas, life satisfaction is conceptualised as being a long-term stable evaluation of one's life (Helliwell & Putnam, 2004).

Easterlin (1974; 1995; 2001) shows that well-being levels across individuals within a specified nation fluctuate directly with income. However, national income increases do not result in greater national well-being levels (Easterlin, 1974). Easterlin's finding was confirmed by subsequent studies based on well-being and within nation income data. Diversely, studies based on well-being and across nation income data identify mixed results (Stevenson & Wolfers, 2008).

Several justifications, for the apparent inconsistent results when regarding the relationship between well-being and income, have been suggested (Clark *et al.*, 2008). Firstly, several empirical results show that well-being is determined by the discrepancy between absolute and relative income (Senik, 2005). This theory of relative income specifies that an individual's well-being depends not only on absolute income but also on relative income. As stated by Easterlin "*happiness, or subjective well-being, varies directly with one's own income and inversely with the incomes of others*" (Easterlin, 1995: 36). When national economic activity rises, individual income and reference income grow at similar rates causing little or no variation amongst the two and consequently, aggregate well-being levels remain unchanged. Section 2.2 comprises of an empirical literature review of the importance of absolute, reference and relative income on individual well-being.

Numerous economists have studied the within country relationship between individual well-being and income. A clear consensus has emerged in the literature (Stevenson & Wolfers, 2008). This consensus states that regressions of well-being on income, using cross-sectional survey data from a particular nation, reveal significant positive income

coefficient estimates. Therefore, within a particular nation richer individuals report higher levels of well-being than poorer individuals. No literature has been identified that contradicts this positive relationship.

Few economic empirical analyses, when focusing on well-being and income, account for reference group income. Studies which do so include Clark and Oswald (1996), Kapteyn *et al.,* (1997), Van de Stadt *et al.,* (1985), McBride (2001) and Ferrer-i-Carbonell (2005). These studies all report reference group income as having a negative effect on individual well-being. The effect of relative income on well-being has been studied by a number of economists (Dolan *et al.,* 2008). Findings report a positive relative income impact on well-being. Thus, the richer individuals are compared to their reference group the happier they will be.

Another explanation for the seemingly conflicting Easterlin (1974) findings is the modified Easterlin hypothesis. This hypothesis states that upon obtaining a particular income level, enabling the consumption of basic needs, raising income further no longer results in greater well-being. Thus, raising income does not increase well-being ad infinitum as increases in well-being tail off as absolute income rises (Frey & Stutzer, 2002b). This hypothesis assumes that once an individual's basic material needs are satisfied, non-material wealth such as health and religion primarily determines an individual's well-being. This hypothesis coincides with the theory of diminishing marginal utility of consumption and income which is characterised by the neoclassical theory of utility. Section 2.3 contains an empirical literature review relating to the analysis of the existence of a particular income level beyond which a change in the well-being-income relationship occurs.

A clear consensus concerning the existence or magnitude of the modified Easterlin hypothesis has not been reached. Statements regarding the existence of a satiation point were made by a number of economists. Layard (2003), Frey and Stutzer (2002a) and Layard (2005a) all claim such an existence when conducting visual analysis of a scatter plot depicting GDP per capita on the horizontal axis and well-being on the vertical axis. However, these visual scatter plot examinations, of the well-being-income relationship, are of limited use (Frey & Stutzer, 2002a). Despite vast claims of the existence of such a satiation point no study finds official statistical evidence to support it (Stevenson &

Wolfers, 2013). Indeed other economic studies report statistical evidence of no satiation point after which the positive well-being-income relationship flattens out. These studies include Stevenson and Wolfers (2008), Stevenson and Wolfers (2013), Deaton (2008) and Sacks *et al.*, (2010).

Another cited clarification, for the apparent opposing Easterlin (1974) findings, stems from the effect that income inequality has on well-being. Section 2.4 reviews empirical literature concerning the effect of income inequality on well-being. A negative well-being-income-inequality relationship is found by early economic literature (Morawetz *et al*., 1977). However, recent research reports diverse empirical results when determining the extent and whether income inequality affects subjective well-being (Alesina *et al.*, 2004; Graham & Felton, 2006; O'Connell, 2004). A common justification states that income inequality may be an indication of income mobility and available opportunities as well as being an indication of injustice (Graham & Felton, 2005). On the one side the tunnel effect theory by Hirschman and Rothschild (1973) states that individuals may value inequality if it indicates social mobility. Furthermore, national income inequality has been stated as an essential condition to generate incentives for economic activity and competitiveness (Clark, 2003; Alesina *et al.*, 2004; Verme, 2011). Indeed, economic policy of freedom and entrepreneurship may result in an increase in income inequality. However, such economic policies are also believed to result in greater economic affluence and a perception of individual accountability for economic achievement in residents (De Haan & Sturm, 2000). From the tunnel effect theory's perspective, income inequality may result in greater individual well-being.

On the contrary, the relative deprivation theory by Runciman (1966) predicts that growth in income inequality will result in a rise in relative deprivation and a fall in individual well-being. Furthermore, high income inequality is associated with low social trust and divisions within society (Gustavsson & Jordahl, 2008). Additionally, it is related to social problems including poverty, deprivation, high crime rates (Beja, 2011) and a contradiction of basic ideas of justice (Alesina *et al.*, 2004). Individuals may also have an aversion towards income inequality if they believe that in a more equal society they would be better off (Piketty, 1995; Bénabou & Ok, 2001). Thus, from the relative deprivation theory's perspective income inequality is likely to result in lower individual well-being.

The vast quantity of economic empirical research finds that individuals are averse to income inequality. The availability of self-reported well-being data of national representative surveys has enabled the testing of whether income inequality affects individual well-being from numerous nations with diverse macroeconomic and socio-political conditions. Economic empirical analysis in this area, primarily measures well-being by self-reported subjective well-being questions from large-scale surveys (Ferrer-i-Carbonell & Ramos, 2014). This well-being data is then used to proxy individual utility (Ferrer-i-Carbonell & Ramos, 2014). The Gini coefficient is the most frequently used indicator of income inequality (Sen, 1973; Cowell, 1977). Indeed, except very few exemptions, economic literature on well-being and inequality use the Gini coefficient at the regional or national level as the measurement of inequality (Ferrer-i-Carbonell & Ramos, 2014).

Chapter 3 presents a description of the data used. This thesis, in order to explore the possible explanations of the inconsistent findings provided by Easterlin (1974), uses cross-sectional data obtained from the EVS 2008. The EVS is a large-scale, cross-national survey research program which concerns itself with human values (EVS, 2011). In particular it provides insight into the opinion's on family, work, religion, politics and society of European citizens.

The empirical analysis of this thesis is based on the subjective, self-reported measure of well-being namely, happiness and life satisfaction. Life satisfaction data is derived from the following EVS question: "*How satisfied are you with your life?"* Interviewees ranked their responses on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Life satisfaction refers to the overall cognitive evaluation of an individual's own life. Happiness data is derived from the EVS question which reads as follows: "*All things together how happy are you*?" Interviewees ranked their responses on an ordered scale, with the options of choosing "not at all happy", "not very happy", "quite happy" or "very happy". Happiness refers to immediate positive or negative emotions experienced by an individual when considering all aspects of their life.

In chapter 3 a comprehensive review of the EVS 2008 Irish and integrated data is presented. The dependent variables, life satisfaction and happiness, are described along with the primary independent variables, household income, national income and income

inequality. Preliminary bivariate analysis and cross tabulations are presented to show the relationship between the dependent and independent variables. Chapter 3 also contains the descriptive statistics of the dependent and independent variables, which determine the well-being-income relationship, employed in Chapter 4, Chapter 5 and Chapter 6 of this thesis.

Chapter 4 presents an empirical analysis of the importance of absolute, reference and relative income on individual well-being in Ireland. Four primary hypotheses are tested; Firstly, whether individual income results in a positive effect on individual well-being; Secondly, whether reference group income results in a negative effect on individual well-being; Thirdly, whether relative income results in a positive effect on individual well-being; And finally, whether the effect of income on well-being is affected by the different definitions of well-being, namely that of happiness and life satisfaction. The empirical assessment is estimated by applying the ordered probit technique to Irish 2008 EVS data. Individual well-being levels are measured by self-reported happiness and life satisfaction EVS data.

Chapter 5 presents an empirical analysis of the existence of a particular income level beyond which a change in the well-being-income relationship occurs. This assertion is referred to as the modified Easterlin hypothesis (Stevenson & Wolfers, 2013). Two variations of the hypothesis are tested; Firstly, that beyond a particular threshold of basic needs, income is uncorrelated with well-being; Secondly, that the well-being-income relationship determined for poor economies differs from that determined for rich economies. The empirical assessment is estimated by applying the ordered probit technique to data from the integrated 2008 wave of the EVS. Individual well-being levels are measured by self-reported happiness and life satisfaction EVS data.

Chapter 6 presents an empirical analysis of the effect of income inequality on European resident's well-being levels. Three variations of the hypothesis are tested: Firstly, whether income inequality affects aggregate national well-being levels; Secondly, whether the well-being-income-inequality relationship determined for low income individuals differ from that determined for high income individuals; And finally, if the effect of income inequality on well-being is affected by the various definitions of well-being: precisely "happiness" and "life satisfaction". The empirical assessment is estimated by applying

the ordered probit technique to cross sectional data of European residents obtained from the 2008 wave of the EVS. Individual well-being levels are measured by self-reported happiness and life satisfaction EVS data. National inequality levels are measured by the Gini coefficient obtained from Eurostat data. What follows in the subsequent section are the primary findings of this thesis.

7.2: Empirical Results

The main findings of this thesis are:

- A positive relationship between well-being and absolute household income.
- A positive relative income coefficient.
- A negative correlation between well-being and reference income.
- A positive national income well-being relationship.
- No evidence of a satiation point after which raising income no longer results in greater well-being.
- A negative well-being-income-inequality relationship.

When determining the importance of absolute, reference and relative income on individual well-being in Ireland, results show a statistically significant positive absolute income coefficient. Thus, in Ireland richer individuals are found to report higher levels of well-being than co-citizens at the bottom of the income distribution. Results show that an increase in absolute income raises the probability of reporting oneself as “very happy” by 7.4%. Reference income results find a negative coefficient illustrating that higher reference group income results in lower subjective well-being. Findings illustrate that an increase in reference income decreases the probability of reporting oneself as “very happy” by 7.2%. A positive relative income coefficient is found. Hence, in Ireland the richer a particular individual is compared to his/her reference group the higher subjective well-being that individual will possess. Results depict that rising relative income increases the probability by 0.1 percentage points of stating the highest happiness level. Therefore, this thesis confirms the importance of peer group income on well-being as a potential clarification of the seemingly conflicting Easterlin (1974) findings. Reference and relative income findings are however, non-statistically significant.

When determining the importance of absolute, reference and relative income on individual well-being in Ireland it is identified that, in the context of considerable similarity, particular variations between the happiness and life satisfaction regression results are found. Primarily, findings illustrate that non-economic conditions have a larger effect on happiness than life satisfaction. Economic conditions however, depict a larger

effect on life satisfaction than happiness. Table 7.4 depicts a summary of the main findings when determining the importance of absolute, reference and relative income on individual well-being in Ireland

Table 7.4: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Irish 2008 EVS Data

Variable Name	Happiness Coefficient (β) and Z-Stat (1)	Life Satisfaction Coefficient (β) and Z-Stat (2)
In(Absoluteincome)	0.189** (2.33)	0.353*** (4.97)
In(ReferenceIncom)	-0.185 (-1.33)	-0.193 (-1.59)
In(RelativeIncome)	0.001 (1.54)	0.001 (0.36)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

When determining the existence of a particular income level beyond which a change in the well-being-income relationship occurs, a strong relationship between well-being and national income is identified. This result challenges the Easterlin paradox. A visual examination of a non-parametric fit in the form of a local linear regression illustrates equivalent findings. Indeed, a highly statistical positive relationship between national well-being and national income is found whether: well-being is measured by happiness or life satisfaction data; a non-parametric or an ordered probit regression analyses is employed; the entire sample, rich or poor sample is analysed. Therefore, no evidence of a satiation threshold, beyond which richer nations have no further increases in well-being when GDP per capita rises, is found. This result falsifies previous claims of a satiation point after which greater GDP per capita is not associated with higher well-being. Table 7.5 depicts a summary of the main findings when determining the existence of a particular income level beyond which a change in the well-being-income relationship occurs.

Table 7.5: Cross National Evidence of a Satiation Point in the Well-Being-Income Relationship, Ordered Probit Results – European 2008 EVS Data

Well-Being-Data	β_{all} and Z-Stat (1)	β_{rich} and Z-Stat (2)	β_{poor} and Z-Stat (3)
Life Satisfaction Data			
logGDP	0.098*** (10.66)	0.188*** (11.28)	0.044** (2.23)
Happiness Data			
logGDP	0.172*** (16.59)	0.393*** (20.73)	0.096*** (4.39)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

When estimating the well-being-income-inequality gradient for all respondents, results reveal a highly statistically significant negative relationship. Results depict that an increase in income inequality decreases the probability of reporting oneself as "very happy" by 0.3%.When estimating the well-being-income-inequality gradient for both rich and poor respondents, with a cut-off level of annual household income of $15,000, results also identify a highly statistically significant negative relationship. Findings illustrate that an increase in income inequality decreases the probability of poor individuals reporting themselves as "very happy" by 0.2%. Results show that an increase in income inequality decreases the probability of rich individuals reporting themselves as "very happy" by 0.4%. Therefore, irrespective of an individual's income level, living in a nation which is characterised with high income inequality reduces well-being levels. Indeed when comparing poor and rich results the rich coefficient is larger than the poor coefficient. Thus, rich individuals are more negatively affected by income inequality than poor individuals.

Globalization and market capitalism have increased inequality within most nations (Freeman, 2011). This thesis verifies that an increase in income inequality results in a decline in average well-being levels whether the full sample, rich sample or poor sample is analysed. Therefore, these results conform to Runciman's relative deprivation theory

which predicts that growth in income inequality will result in a rise in relative deprivation and a fall in individual well-being. This finding may explain Easterlin's (1974) claim that average reported well-being do not have a strong correlation with average levels of national income. Table 7.6 depicts a summary of the main findings when determining the effect of income inequality on European resident's well-being levels.

Table 7.6: The Effect of Income inequality on Individual Happiness and Life Satisfaction Using an Ordered Probit Model - European 2008 EVS Data

Well-Being-Data	**β_{all} and Z-Stat (1)**	**β_{rich} and Z-Stat (2)**	**β_{poor} and Z-Stat (3)**
Life Satisfaction Data			
Gini	-0.026*** (-16.7)	-0.034*** (-15.39)	-0.020*** (-8.4)
Happiness Data			
Gini	-0.012*** (-6.44)	-0.012*** (-4.64)	-0.012*** (-4.67)

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

There are a number of policy implications and future research with respect to well-being in Europe, which arise from this thesis. These implications and research proposal are presented in the following section.

7.3: Policy Implications and Future Research

Well-being is an individual's evaluation of their own life regarded as a whole (Sarracino, 2013). This definition includes both positive and negative evaluations (Diener, 2006). Well-being is related to an individual's physical, social and mental state (NESC, 2009). It is the role of public policy to bring about conditions that place individuals and their well-being at the centre of policy development and delivery by assessing risk and ensuring support systems are in place (NESC, 2009). There is a growing need to identify measures of individual well-being in conjunction with income-based measures to provide a comprehensive picture of social progress and national well-being (New Economics Foundation, 2009).

This thesis identifies the accuracy and likely explanations for the seemingly conflicting results provided by Easterlin (1974). Thus, this thesis provides reliable research into the relationship between well-being and income. Individuals with high levels of well-being are valuable to nations (Diener & Seligman, 2004). The results provide governments with invaluable evidence when implementing effective well-being enhancing policies.

Public policies which focus on enhancing well-being may result in positive effects on productivity and individual income as well as on personal factors which benefit the economy as a whole (Helliwell, 2003). With concerns to employment, individuals with high levels of well-being and job satisfaction are those with less job turnover, less work avoidance, higher work efficiency and more responsible work conduct (Diener & Seligman, 2004). Therefore, the cost associated with an unhappy work force is vast. Individuals with greater well-being earn higher incomes and have superior work performance than those with lower well-being. Frank (1997) states that individuals who report high well-being levels take less days off work, are not as likely to take part in work disputes and are more likely to help co-workers if asked. These attributes result in higher productivity and a more positive work environment.

Research also finds that high levels of average well-being is substantially related to nationwide patterns including low levels of divorce, high participation in voluntary organizations and more trusting citizens (Diener & Seligman, 2004). Individuals, living in nations with higher levels of average well-being, also report better physical and mental

health and lower suicide rates are recorded (Helliwell & Putnam, 2004). Policies aimed at increasing the well-being of workers are beneficial for both enhancing well-being in a significant realm of life and increasing economic productivity and profitability (Diener & Seligman, 2004).

A primary finding of this thesis indicates that individuals living in Ireland significantly care about their absolute level of income. Happiness is considered as an ultimate goal of life (Frey & Stutzer, 2002a). The relative and reference income coefficients suggest that individuals are also concerned with their income relative to the incomes of their peer group. Reference income results find a negative coefficient illustrating that higher reference group income results in lower subjective well-being. A positive relative income coefficient is found. Hence, in Ireland the richer a particular individual is compared to his/her reference group the higher subjective well-being that individual will possess.

In order to achieve a maximisation of aggregate well-being in Ireland this thesis suggests government policy to account for the effects of absolute as well as peer group income on individual well-being in Ireland. Results of this thesis highlight the importance of evaluating aggregate well-being levels instead of individual well-being levels when determining policy decisions. If governments encourage an increase in household income, without concern for the importance of peer group income on well-being, predicted increases in well-being may be less than expected.

Confidence intervals at the 95% significance level are also constructed when determining the importance of absolute, reference and relative income on individual well-being in Ireland. These are presented in Table 7.4.1.

Table 7.4.1: 95% Confidence Intervals Showing True Estimate of Income in Ireland

	Ordered Probit Happiness Estimation		**Ordered Probit Life Satisfaction Estimation**	
In(Absoluteincome)	0.156	0.408	0.197	0.421
In(ReferenceIncom)	-0.097	-0.369	-0.017	-0.257
In(RelativeIncome)	0.001	0.002	0.001	0.002

(Source: Author's own)

The ordered probit happiness estimation confidence intervals show that it can be stated with 95% certainty that the true estimates of; absolute income lie between 0.156 and 0.408; Reference income lie between -0.097 and -0.369; Relative income lie between 0.001 and 0.002. It is important that the confidence intervals do not cross zero. This means that it can be stated with 95% certainty that the true value of absolute income, reference income and relative income do not equal zero.

Another key result of this thesis is that the estimated subjective well-being-income gradient is statistically significant for both across country and within country results. This finding contradicts the Easterlin paradox. A clear positive relationship between average levels of well-being and GDP per capita across nations is established. Indeed, this thesis finds a highly statistical positive relationship between national well-being and national income whether; well-being is measured by happiness or life satisfaction data; a non-parametric or an ordered probit regression analyses is employed; the entire sample, rich or poor sample is analysed. Therefore, no evidence of a satiation threshold, beyond which richer nations have no further increases in well-being when GDP per capita rises, is found. This result falsifies previous claims of a satiation point after which greater GDP per capita is not associated with higher well-being. Therefore, this thesis recommends economic growth to remain a primary aim of European governments.

Confidence intervals at the 95% significance level are constructed when determining the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe. These are presented in Table 7.5.1

Table 7.5.1: 95% Confidence Intervals Showing True Estimate of Income in European Nations

Income Categories	Whole Sample		Rich Sample		Poor Sample	
Ordered Probit Life Satisfaction Estimation	0.299	0.322	0.468	0.515	0.050	0.123
Ordered Probit Happiness Estimation	0.344	0.369	0.650	0.702	0.080	0.159

(Source: Author's own)

The ordered probit happiness estimation confidence intervals show that it can be stated with 95% certainty that the true estimates of GDP lie between 0.344 and 0.369 for the

whole sample, 0.650 and 0.702 for the rich subsample and 0.080 and 0.159 for the poor subsample. It is imperative that the confidence intervals do not cross zero. This means that it can be stated with 95% certainty that the true value of GDP does not equal zero.

When estimating the well-being-income-inequality gradient for both rich and poor respondents, with a cut-off level of annual household income of $15,000, results show a highly statistically significant negative relationship. Therefore, irrespective of whether an individual is rich or poor, living in a nation which is characterised with high income inequality reduces well-being levels in Europe. Indeed when comparing poor and rich results the rich coefficient is larger than the poor coefficient. Thus, rich individuals are more negatively affected by income inequality than poor individuals.

Doubts have been raised about the benefits to an economy with high rates of GDP growth without at the same time accounting for distributional effects (Angeriz *et al*., 2011). In order to achieve the maximisation of aggregate well-being in Europe this thesis suggests government policy to account for the negative effect of income inequality on well-being. This thesis highlights the importance of policies concerning income redistribution in order to maximize aggregate well-being levels in Europe.

Confidence intervals at the 95% significance level are also constructed when estimating the well-being-income-inequality gradient in Europe. These are presented in Table 7.6.1

Table 7.6.1: 95% Confidence Intervals Showing True Estimate of Income Inequality in European Nations

Income Categories	Whole Sample		Rich Sample		Poor Sample	
Ordered Probit Life Satisfaction Estimation	-0.045	-0.040	-0.044	-0.038	-0.028	-0.020
Ordered Probit Happiness Estimation	-0.040	-0.035	-0.032	-0.025	-0.027	-0.018

(Source: Author's own)

The ordered probit happiness estimation confidence intervals show that it can be stated with 95% certainty that the true estimates of income inequality lie between -0.040 and -0.035 for the whole sample, -0.032 and -0.025 for the rich subsample and -0.027 and -

0.018 for the poor subsample. This means that it can be stated with 95% certainty that the true value of GDP does not equal zero.

Future research in this area will aim to examine the across time relationship between within country comparisons of well-being and income. Thus, the aim of this future research will be to determine whether nations get happier over time as they become richer. Although there is a large body of research, on well-being and income over time, existing results are mixed. Researchers have found a positive (Stevenson & Wolfers, 2008), negative (Blanchflower & Oswald, 2004a) or no relationship (Easterlin, 1974; 1995) when concerning the across time association between well-being and economic growth. This future research will further aid policy makers when assessing which well-being enhancing policies to adopt.

7.4: Chapter Conclusion

Happiness is considered as an ultimate goal of life (Frey & Stutzer, 2002a). Indeed virtually everybody wants to be happy (Frey & Stutzer, 2002b). The aim of this thesis is to explore the possible explanations of the apparent contradictory results provided by Easterlin (1974), by using cross sectional data of European residents obtained from the 2008 wave of the EVS. Easterlin (1974) reports that average national well-being is unrelated to GDP per head while at the micro level, well-being and individual income are positively related. The aim of this thesis is achieved by estimating the well-being-income relationship in many different ways. Firstly, Chapter 4 presents an empirical analysis of the importance of absolute, reference and relative income on individual well-being levels in Ireland. Secondly, Chapter 5 examines the existence of a particular income level beyond which a change in the well-being-income relationship occurs in Europe. Thirdly, Chapter 6 assesses the effect of income inequality on well-being levels in Europe.

The main findings of this thesis are:

- A positive relationship between well-being and absolute household income.
- A positive relative income coefficient.
- A negative correlation between well-being and reference income.
- A positive national income well-being relationship.
- No evidence of a satiation point after which raising income no longer results in greater well-being.
- A negative well-being-income-inequality relationship.

Therefore, this thesis rejects the findings of the Easterlin paradox as a strong relationship between well-being and national income is found in this research. Indeed, the identified relationship between well-being and firstly, peer group income and secondly, income inequality is the only possible explanation, found by this thesis, for Easterlin's (1974) claim that average reported well-being levels do not have a strong correlation with average levels of national income. This thesis provides policy makers with a clear consensus regarding the well-being-income relationship which may be used when advising governments on effective well-being enhancing policies.

BIBLIOGRAPHY

Adelman I. and Morris C. T. (1973). *Economic growth and social equity in developing countries*. Stanford University Press.

Aghion P. and Bolton P. (1997). A theory of trickle-down growth and development. *The Review of Economic Studies, 64*(2): 151-172.

Agresti A. (1990).*Categorical Data Analysis.* New York: Wiley.

Ahluwalia M. S. (1976). Inequality, poverty and development. *Journal of development economics, 3*(4): 307-342.

Akay A. and Martinsson P. (2012). Positional concerns through the life cycle: Evidence from subjective well-being data and survey experiments. IZA DP n 6342.

Alesina A. and Angeletos G.M. (2005). Corruption, inequality, and fairness. *Journal of Monetary Economics,* 52(7): 1227-1244.

Alesina A., Di Tella R. and MacCulloch R. (2004). Inequality and happiness: Are Europeans and Americans different? *Journal of Public Economics*, 88(9): 2009-2042.

Alesina A. and Giuliano P. (2011). Preferences for redistribution. In J. Benhabib, A. Bisin and M.O. Jackson (eds.), Handbook of Social Economics (Chapter 3). New York: Elsevier.

Alesina A. and Glaeser E. L. (2004). *Fighting poverty in the US and Europe: A world of difference* (p. 129). Oxford: Oxford University Press.

Alesina A. and Perotti R. (1994). The political economy of growth: a critical survey of the recent literature. *The World Bank Economic Review, 8*(3): 351-371.

Aleskerov F., Bouyssou D. and Monjardet B. (2007). *Utility maximization, choice and preference* (Vol. 16). Springer Science & Business Media.

Allison P. D. (1978). Measures of inequality. *American sociological review,* 43(6): 865-880.

Anand S. and Kanbur S. R. (1993). Inequality and development A critique. *Journal of Development economics, 41*(1): 19-43.

Anand S. and Ravallion M. (1993). Human development in poor countries: on the role of private incomes and public services. *The Journal of Economic Perspectives,* 7: 133-150.

Angeriz A., Arestis P. and Chakravarty S. P. (2011). Inequality adjusted growth rates in Latin America. *Cambridge Journal of Regions, Economy and Society, 4*(1): 49-62.

Angrist J.D. and Pischke J.S. (2009). *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton, NJ: Princeton University Press.

Arrindell W. A., Hatzichristou C., Wensink J., Rosenberg E., van Twillert B., Stedema J. and Meijer D. (1997). Dimensions of national culture as predictors of cross-national differences in subjective well-being. *Personality and Individual Differences*, *23*(1): 37-53.

Atkinson A. B. (1970). On the measurement of inequality. *Journal of economic theory*, *2*(3): 244-263.

Atkinson A. B. (1974). *The Economics of Inequality*. New York: Oxford University press.

Atkinson A. B. (1983). *The Economics of Inequality*. Second edition, Claredon Press, Oxford.

Atkinson A. B., Rainwater L. and Smeeding T. M. (1995). *Income distribution in OECD countries: evidence from the Luxembourg Income Study*. Organisation for Economic Co-operation and Development.

Barker C. and Martin B. (2012). Income and Happiness: Why isn't research acted upon? *Social Alternatives*, *31*(4): 62.

Bearden W. O. and Etzel M. J. (1982). Reference group influence on product and brand purchase decisions. *Journal of consumer research*, 9(2): 183-194.

Beja E. (2011). Subjective well-being approach to the valuation of income inequality. *MPRA Paper* (34177).

Bellù L. G. and Liberati P. (2006). Inequality analysis: The gini index. *Food and Agriculture Organisation, United Nations*.

Bénabou R. and Ok E.A. (2001). Social mobility and the demand for redistribution: The poum hypothesis. *The Quarterly Journal of Economics*, 116: 447-487.

Bentham J. (1879). *An introduction to the principles of morals and legislation*. Clarendon Press.

Billingsley M. W. (2014). *Income inequality: analysis and recommendation using the Bardach Method* (Doctoral dissertation, California State University, Sacramento).

Björklund A. (1991). Unemployment and income distribution: time-series evidence from Sweden. *The Scandinavian Journal of Economics*, 93: 457-465.

Blanchflower D. and Oswald A. (1998). What makes an Entrepreneur? *Journal of Labour Economics*, 16(1): 26-60.

Blanchflower D. G. and Oswald A. (2000). The rising well-being of the young. In *Youth employment and joblessness in advanced countries* (pp. 289-328). University of Chicago Press.

Blanchflower D. and Oswald A. (2003). *Does Inequality Reduce Happiness? Evidence from the States of the USA from the 1970s to the 1990s.* Mimeographed, Warwick University.

Blanchflower D. and Oswald A. (2004a). Well-Being over Time in Britain and the USA. *Journal of Public Economics,* 88(7): 1359-1386.

Blanchflower D. and Oswald A. (2004b). Money, sex and happiness: An empirical study. *Scandinavian Journal of Economics*, 106(3): 393- 415.

Blanchflower D. G. and Oswald A. J. (2005). Happiness and the Human development index: the paradox of Australia. *Australian Economic Review, 38*(3): 307-318.

Blanchflower D. and Oswald A. (2008). On the curvature of the reporting function from objective reality to subjective feelings. *Economic Letters,* 1000: 396-372.

Blau P. M. (1977). *Inequality and heterogeneity: A primitive theory of social structure* (Vol. 7). New York: Free Press.

Borgonovi F. (2008). Doing well by doing good. The relationship between formal volunteering and self-reported health and happiness. *Social science & medicine*, *66*(11): 2321-2334.

Borjas G. J. (1999). Heaven's door: Immigration Policy and the American Economy, Princeton University Press.

Borooah V.K. (2002). *Logit and Probit: Ordered and Multinomial Models.* Sage University Paper Series on Quantitative Applications in the Social Sciences, 07-138. Thousand Oaks, CA: Sage.

Borooah V. K. (2006). How much happiness is there in the world? A cross-country study. *Applied Economics Letters*, *13*(8): 483-488.

Bourguignon F. (1979). Decomposable income inequality measures. *Econometrica: Journal of the Econometric Society*, 47(4): 901-920.

Brickman P., Coates D. and Janoff-Bulman R. (1978). Lottery winners and accident victims: Is happiness relative? *Journal of personality and social psychology*, *36*(8): 917.

Bruni L. and Porta P. L. (2007). *Handbook on the Economics of Happiness*. Cheltanham, UK; Northhampton, MA: Elgar.

Bruno M., Ravallion M. and Squire L. (1996). *Equity and growth in developing countries: old and new perspectives on the policy issues* (Vol. 1563). World Bank Publications.

Buchanan W. and Cantril H. (1953). *How Nations See Each Other.* Urbana: University of Illinois Press.

Bukenya J. O., Gebremedhin T. G. and Schaeffer P. V. (2003). Analysis of rural quality of life and health: A spatial approach. *Economic Development Quarterly*, *17*(3): 280-293.

Bulíř M. A. (1998). *Income inequality: does inflation matter?* International Monetary Fund.

Campbell H. F. (2003). *Benefit-cost analysis: financial and economic appraisal using spreadsheets*. Cambridge University Press.

Cameron C. and Miller D.L. (2010). Robust inference with clustered data (No. 10, 7). Working Papers, University of California, Department of Economics.

Cantril H. (1951). *Public Opinion, 1935-1946.* Princeton, New Jersey: Princeton University Press.

Cantril H. (1965). *The pattern of human concerns.* New Brunswisk, New Jersey: Rutgers University Press.

Caporale G.M., Georgellis Y., Tsitsianis N. and Yin Y. (2009). Income and happiness across Europe: Do reference values matter? *Journal of Economic Psychology*, *30*(1): 42-51.

Carr M. D. (2013). Local Area Inequality and Worker Well-Being. *Review of Social Economy, 71*(1): 44-64.

Cassel G. (1918). Abnormal deviations in international exchanges. *The Economic Journal*, *28*(112): 413-415.

Champernowne D. G. (1974). A comparison of measures of inequality of income distribution. *The Economic Journal*, 787-816.

Childers T. L. and Rao A. R. (1992). The influence of familial and peer-based reference groups on consumer decisions. *Journal of consumer research*, 19(2): 198-211.

Clark J. M. (1918). Economics and Modern Psychology: I. *The Journal of Political Economy*, 1-30.

Clark A. (1998). *Measures of job satisfaction: What makes a good job? Evidence from OECD countries* (No. 34). OECD Publishing.

Clark A. (2001). What really matters in a job? Hedonic measurement using quit data. *Labour Economics*, 8(2): 223-242.

Clark A. E. (2003). Inequality aversion and income mobility: A direct test. In Delta Working Papers, 11.

Clark A. E., Frijters P. and Shields M. A. (2006). Income and happiness: Evidence, explanations and economic implications. *Paris Jourdan Sciences Economiques*, *2024*.

Clark A. E., Frijters P. and Shields M.A. (2008). Relative Income, Happiness, and Utility: An Explanation for the Easterlin Paradox and Other Puzzles. *Journal of Economic Literature*, 46(1): 95-144.

Clark A. E., Kristensen N. and Westergård-Nielsen N. (2009). Job Satisfaction and Co-worker Wages: Status or Signal?*. *The Economic Journal*, *119*(536): 430-447.

Clark A. and Lelkes O. (2005). Deliver us from evil: religion as insurance. *Papers on Economics of Religion, 603*: 1-36.

Clark A. and Oswald A. (1994). Unhappiness and Unemployment. *The Economic Journal*, 104(424): 648-659.

Clark A. and Oswald A. (1996). Satisfaction and Comparison Income. *Journal of Public Economics, 61*(3): 359-381.

Clark A. E. and Oswald A. J. (2002). A simple statistical method for measuring how life events affect happiness. *International Journal of Epidemiology*, *31*(6): 1139-1144.

Clark A. E. and Senik C. (2010). Who compares to whom? The anatomy of income comparisons in Europe. *The Economic Journal*, *120*(544): 573-594.

Cowell F. A. (1995). Measuring Inequality, nd Hemel Hempstead: Harvester Wheatsheaf.

Cowell F. (1977). *Measuring inequality: techniques for the social sciences*. Wiley.

Cowell F. A. (1980). On the structure of additive inequality measures. *The Review of Economic Studies*, 47: 521-531.

Cowell F. A. (2000). Measurement of inequality. *Handbook of income distribution*, *1*: 87-166.

Cowell F.A. and Amiel Y. (1999) Thinking about Inequality, Cambridge, England; New York: Cambridge University Press.

Dalton H. (1920). The measurement of the inequality of incomes. *The Economic Journal*, 348-361.

Davidov E., Schmidt P. and Billiet J. (2011). *Cross-cultural analysis: Methods and applications*. Routledge.

Deaton A. (2008). Income, Health, and Well-Being around the World: Evidence from the Gallup World Poll. *Journal of Economic Perspectives*, 22(2): 53-72.

Deiner E., Suh E., Lucas R. E. and Smith H. L. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin*, *125*(2): 276-302.

Deininger K. and Squire L. (1998). New ways of looking at old issues: inequality and growth. *Journal of development economics*, *57*(2): 259-287.
De Gregorio J. and Lee J. W. (2002). Education and income inequality: New evidence from cross-country data. *Review of income and wealth*, *48*: 395-416.

De Haan J. and Sturm J. (2000). On the relationship between economic freedom and economic growth. *European Journal of Political Economy*, 16(2): 215-241.

De Maio F. G. (2007). Income inequality measures. *Journal of epidemiology and community health*, *61*(10): 849-852.

Diener E. (1984). Subjective Well-Being. *Psychological Bulletin*, 95(3): 542-75.

Diener E. (2000). Subjective well-being: The science of happiness and a proposal for a national index. *American psychologist*, *55*(1): 34.

Diener E., Sandvik E., Seidlitz L. and Diener M. (1993). The relationship between income and subjective well-being: Relative or absolute? *Social Indicators Research*, *28*(3): 195-223.

Diener E., Diener M. and Diener C. (1995). Factors predicting the subjective well-being of nations. *Journal of personality and social psychology*, *69*(5): 851.

Diener E. (2006). Guidelines for National Indicators of Subjective Well-Being and Ill-Being. *Journal of Happiness Studies*, 7(4): 397-404.

Diener E., Lucas R. E. and Scollon C. N. (2006). Beyond the hedonic treadmill: revising the adaptation theory of well-being. *American Psychologist*, *61*(4): 305.

Diener E. and Seligman M.E.P (2004). Beyond money: Toward an economy of well-being. *Psychological Science in the Public Interest*, 5(1): 1-31.

Diener E., Tay L. and Oishi S. (2013). Rising income and subjective wellbeing in nations. *Journal of Personality and Social Psychology*, 104(2): 267.

Diener E. and Tov W. (2007). "Culture and Subjective Well-Being." In Shinobu Kitayama and Dov Cohen, eds., Handbook of Cultural Psychology. New York: Guilford.

Di Tella R., MacCulloch R. J. and Oswald A. J. (1999). *How Do Macroeconomic Fluctuations Affect Happiness?* Harvard Business School, mimeo.

Di Tella R., MacCulloch R. and Oswald A. (2001). Preferences over inflation and unemployment. Evidence from surveys of happiness. *The American Economic Review*, 91(1): 335-341.

Di Tella R., MacCulloch R. and Oswald A. (2003). The macroeconomics of happiness. *The Review of Economics and Statistics*, 85(4): 809-827.

Di Tella R. and MacCulloch R. (2008). Happiness Adaptation to Income beyond "Basic Needs" (No. w14539). National Bureau of Economic Research.

Di Tella R. and MacCulloch R. (2009). Why doesn't capitalism flow to poor countries? Comments and discussion. Brookings Papers in Economic Activity, 285-321.

Dockery A.M. (2003). Happiness, life satisfaction and the role of work: Evidence from two Australian surveys. *Full Employment Imperative,* 77.

Dolan P., Peasgood T. and White M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology,* 29(1): 94-122.

Dolan P. and White M. P. (2007). How can measures of subjective well-being be used to inform public policy? *Perspectives in Psychological Science,* 2(1): 71-85.

Doorslaer E. V. and Koolman X. (2004). Explaining the differences in income-related health inequalities across European countries. *Health economics*, *13*(7): 609-628.

Dornbusch R., Krugman P. and Cooper R. N. (1976). Flexible exchange rates in the short run. *Brookings Papers on Economic Activity*, *1976*(3): 537-584.

Duarte R., Escario J. J. and Molina J. A. (2007). Supporting the endogenous relationship between well-being and employment for US individuals. *Atlantic Economic Journal*, *35*(3): 279-288.

Duesenberry J. S. (1952). *Income, saving and the theory of consumer behavior*. Cambridge, MA: Harvard University Press.

Dynan K. E. and Ravina E. (2007). Increasing Income Inequality, External Habits, and Self-Reported Happiness. *American Economic Review Papers and Proceedings,* 97(2): 226-231.

Easterlin R.A. (1974). Does Economic Growth Improve the Human Lot? Some Empirical Evidence. *Nations and Households in Economic growth*, 89: 89-125.

Easterlin R.A. (1995). Will raising the incomes of all increase the happiness of all. *Journal of Economic Behaviour and Organization*, 27(1): 35-47.

Easterlin R.A. (2001). Income and happiness: towards a unified theory. *The Economic Journal*, 111: 465-484.

Easterlin R. A. (2003). Explaining happiness. *Proceedings of the National Academy of Sciences, 100*(19): 11176-11183.

Easterlin R. A. (2005a). Feeding the illusion of growth and happiness: A reply to Hagerty and Veenhoven. *Social indicators research, 74*(3): 429-443.

Easterlin R. A. (2005b). Diminishing marginal utility of income? Caveat emptor. *Social Indicators Research, 70*(3): 243-255.

Easterlin R.A. (2006). Life cycle happiness and its sources. Intersections of psychology, economics and demography. *Journal of Economic Psychology*, 27(4): 463-482.
Ekman P. and Friesen W.V. (1971). Constants across cultures in the face and emotion. *Journal of Social and Personality Psychology*, 17(2): 124-129.

Ekman P., Friesen W.V., O'Sullivan M., Chan A., Diacoyanni-Tarlatzis I., Heider K., Krause R., LeCompte W.A., Pitcairn T., Ricci-Bitti P.E., Scherer K., Tomita M. and Tzavaras A. (1987). Universals and cultural differences in the judgments of facial expressions of emotion. *Journal of Social and Personality Psychology*, 53(4): 712-717.

EVS (2011). European Values Study Longitudinal Data File 1981-2008 (EVS 1981-2008). GESIS Data Archive, Cologne, ZA4804 Data File Version *2.0.0, doi:10.4232/1.11005*.

Falk A. and Knell M. (2000). Choosing the Joneses: On the endogeneity of reference groups. *Institute for Empirical Research, University of Zurich, Working Paper*, (53).

Fehr E. and Schmidt K.M. (1999). A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics,* 114: 817-868.

Ferrer-i-Carbonell A. (2005). Income and well-being: An empirical analysis of the comparison income effect. *Journal of Public Economics*, 89(5): 997-1019.

Ferrer-i-Carbonell A. and Frijters P. (2004). How important is methodology for the estimates of the determinants of happiness. *The Economic Journal*, 114(497): 641-659.

Ferrer-i-Carbonell A. and Gowdy M. (2007). Environmental degradation and happiness. *Ecological Economics*, 60(3): 509-516.

Ferrer-i-Carbonell A. and Ramos X. (2010). Inequality aversion and risk attitudes.

Ferrer-i-Carbonell A. and Ramos X. (2014). Inequality and happiness. *Journal of Economic Surveys*, *28*(5): 1016-1027.

Feinberg S.E. (1980). The Analysis of Cross-Classi1ed Categorical Data. MIT Press, Cambridge, MA.

FitzRoy F. R., Nolan M. A. and Steinhardt M. F. (2011). Age, Life-Satisfaction, and Relative Income: Insights from the UK and Germany. IZA Discussion Papers, No: 6045.

Firebaugh G. (1999). Empirics of world income inequality 1. *American Journal of Sociology*, *104*(6): 1597-1630.

Firebaugh G. (2003). The New Geography of Global Income Inequality, Cambridge, MA: Harvard University Press.

Frank R. H. (1985a). *Choosing the right pond: Human behaviour and the quest for status*. Oxford University Press.

Frank R. H. (1985b). The demand for unobservable and other nonpositional goods. *The American Economic Review, 75*: 101-116.

Frank R. H. (1989). Frames of Reference and the Quality of Life. *The American economic review*, 79 (2): 80-85.

Frank R. H. (1997). The Frame of Reference as a Public Good. *Economic Journal*, 107(445): 1832-1847.

Frank R. H. (1999). *Luxury Fever: Why Money Fails to Satisfy in an Era of Excess*. Free Press, New York.

Freeman R. (2011). Speech at the OECD Policy Forum on Tackling Inequality. *Paris, May*, *2*, 2011.

Frey B.S., Benz M. and Stutzer A. (2004). Introducing procedural utility: Not only what but also how matters. *Journal of Institutional and Theoretical Economics*, 160: 377-401.

Frey B.S. and Stutzer A. (1999). Measuring preferences by subjective well-being. *Journal of Institutional and Theoretical Economics*, 155: 755-78.

Frey B. S. and Stutzer A. (2000a). Happiness, economy and institutions. *The Economic Journal*, 110(466): 918-938.

Frey B. S. and Stutzer A. (2000b). Maximising happiness? *German Economic Review*, *1*(2): 145-167.

Frey B. S. and Stutzer A. (2002a). What can Economists learn from Happiness Research? *Journal of Economic Literature*, 40: 402-435.

Frey B. S. and Stutzer A. (2002b). The economics of happiness. *World Economics*, *3*(1): 1-17.

Frey B. S. and Stutzer A. (2003). Happiness and Economics. How the Economy and Institutions Affect Well-being. Princeton and Oxford: Princeton University Press.

Frey B. S. and Stutzer A. (2005). Beyond outcomes: measuring procedural utility. *Oxford Economic Papers*, *57*(1): 90-111.

Frey B. S. and Stutzer A. (2010). Happiness and Economics: How the Economy and Institutions Affect Well-Being. Princeton: Princeton University Press.

Gasper D. (2004). *Human Well-being: Concepts and Conceptualisations*, WIDER Discussion Paper 2004/6, World Institute for Development Economics Research, Helsinki.

Gerdtham U. G. and Johannesson M. (2001). The relationship between happiness, health, and socio-economic factors: Results based on Swedish microdata. *Journal of Socio-Economics*, 30(6): 553-557.

Gibbs J. T. (1985). Psychosocial factors associated with depression in urban adolescent females: Implications for assessment. *Journal of Youth and Adolescence*, *14*(1): 47-60.

Golden L. and Wiens-Tuers B. (2006). To your happiness? Extra hours of labour supply and worker well-being. *The Journal of Socio-Economics*, *35*(2): 382-397.

Graham C. (2005). The Economics of Happiness: Insights on Globalization from a Novel Approach. *World Economics*, 6(3): 41-55.

Graham C. (2008). Economics of happiness. In: Durlauf SN, Blume LE, editors. The New Palgrave Dictionary of Economics. Palgrave Macmillan.

Graham C., Eggers A. and Sukhtankar S. (2004). Does happiness pay?: An exploration based on panel data from Russia. *Journal of Economic Behaviour & Organization*, 55(3): 319-342.

Graham C. and Felton A. (2005). Does inequality matter to individual welfare? An initial exploration based on happiness surveys from Latin America. *Centre on Social and Economic Dynamics Working Paper*, (38).

Graham C. and Felton A. (2006). Inequality and happiness: Insights from Latin America. *Journal of Economic Inequality*, 4(1): 107-122.

Graham C. and Pettinato S. (2002). Happiness and Hardship: Opportunity and Insecurity in New Market Economies. Washington, D.C.: Brookings Institution Press.

Greene W. H. (2000). *Econometric Analysis* (4th Edition). Prentice Hall, Upper Saddle River, New Jersey.

Gregory M. B. (2009). Gender and economic inequality. The Oxford Handbook of Economic Inequality, Oxford University Press, Oxford.

Grosfeld I. and Senik C. (2010). The emerging aversion to inequality. *Economics of Transition*, 18(1): 1-26.

Gujarati D. N. (2011). *Econometrics by Example.* Palgrave Macmillan.

Gupta I. and Mitra A. (2004). Economic growth, health and poverty: An exploratory study for India. *Development policy review*, *22*(2): 193-206.

Gustafsson B. and Johansson M. (1999). In search of smoking guns: What makes income inequality vary over time in different countries? *American sociological review*, 585-605.

Gustavsson M. and Jordahl H. (2008). Inequality and trust in Sweden: Some inequalities are more harmful than others. *Journal of Public Economics*, 92(1): 348 -365.

Guven C., Senik C. and Stichnoth H. (2010). You can't be happier than your wife. Happiness gaps and divorce. *Journal of Economic Behaviour & Organization*, 82(1): 110-130.

Hagerty M. R. (2000). Social comparisons of income in one's community: evidence from national surveys of income and happiness. *Journal of personality and social psychology*, *78*(4): 764.

Hamermesh D. S. (2004). Association Lecture. *Southern Economic Journal*, *71*(1): 2-11.

Hartog J. and Oosterbeek H. (1998). Health, wealth and happiness: why pursue a higher education? *Economics of Education Review,* 17(3):245-256.

Helliwell J. F. (2003). How's life? Combining individual and national variables to explain subjective well-being. *Economic Modelling,* 20(2): 331-360.

Helliwell J. F. and Putnam R. (2004). The social context of well-being. *Philosophical Transactions of the Royal Society London,* 359: 1435-1446.

Hicks J.R. (1939). *Value and Capital,* Second Edition. Oxford: Clarendon Press.

Hicks J. R. (1940). The valuation of the social income. *Economica,* 105-124.

Hilmer M. J. (2001). A comparison of alternative specifications of the college attendance equation with an extension to two-stage selectivity-correction models. *Economics of Education Review*, *20*(3): 263-278.

Hirschman A. and Rothschild M. (1973). The changing tolerance for income in equality in the course of economic development. *Quarterly Journal of Economics,* 87(4): 544-566.

Holländer H. (2001). On the validity of utility statements: standard theory versus Duesenberry's. *Journal of Economic Behavior & Organization, 45*(3): 227-249.

Hopkins E. (2008). Inequality, Happiness and Relative Concerns: What Actually Is Their Relationship? *Journal of Economic Inequality*, 6(4): 351-72.

Idler E. L. and Benyamini Y. (1997). Self-rated health and mortality: a review of twenty-seven community studies. *Journal of health and social behavior,* 21-37.

Inglehart R. (1990). *Culture Shift in Advanced Industrial Society*. Princeton: Princeton University Press.

Inglehart R. (1997). *Modernization and Postmodernization: Cultural, Economic, and Political Change in 43 Societies* (Vol. 19). Princeton, N.J.: Princeton University Press.

Inglehart R. (2000). World Values Surveys and European Values Surveys, 1981-1984, 1990 - 1993, and 1995 – 1997 (Vol. 279). Institute for Social Research, ICPSR version, Ann Arbor, MI.

Inglehart R. and Klingemann H.D. (2000). Genes, culture, democracy and happiness. *Culture and subjective well-being*, 165-183.

Ireland N. J. (1998). Status-Seeking, Income Taxation and Efficiency. *Journal of Public Economics,* 70(1): 99-113.

Irvin G. (2008). *Super rich: The rise of inequality in Britain and the United States*. Polity.

Jenkins S.P. (1991). The measurement of income inequality. *Economic Inequality and Poverty*, 3-31.

Jones A. M. (2007). *Applied econometrics for health economists: a practical guide*. Radcliffe publishing.

Kaasa A. (2003). Factors influencing income inequality in transition economies. *University of Tartu Economics and Business Administration Working Paper Series*, (18).

Kapferer E., Koch A. and Sedmak C. (2012). *The logics of change : poverty, place, identity and social transformation mechanisms*. Newcastle upon Tyne: Cambridge Scholars Pub.

Kahneman D. (1999). *Objective happiness.* In D. Kahneman, E. Diener and N. Schwarz (eds.), Foundations of Hedonic Psychology: Scientific Perspectives on Enjoyment and Suffering (Chapter 1). New York: Russell Sage Foundation.

Kahneman D., Diener E. and Schwarz N. (1999). Foundations of Hedonic Psychology: Scientific Perspectives on Enjoyment and Suffering. Russell Sage Foundation, NY.

Kahneman D. and Krueger A. B. (2006). Developments in the measurement of subjective wellbeing. *Journal of Economic Perspectives*, 22(1): 3-24.

Kaplan G. A., Pamuk E. R., Lynch J. W., Cohen R. D., and Balfour J. L. (1996). Inequality in income and mortality in the United States: analysis of mortality and potential pathways. *Bmj*, *312*(7037): 999-1003.

Kapteyn A. (1977). *A theory of preference formation*. (No. urn: nbn: nl: ui: 12-364727). Tilburg University.

Kapteyn A., Van Praag B.M.S. and Van Herwaarden F.G. (1978). Individual welfare functions and social preference spaces. *Economics Letters*, 1(2): 173-177.

Kapteyn A., Van de Geer S., Van de Stadt H. and Wansbeek T. (1997). Interdependent preferences: an econometric analysis. *Journal of Applied Econometrics*, 12(6): 665-686.

Kapteyn A. and Van Herwaarden F.G. (1980). Independent welfare functions and optimal income distribution. *Journal of Public Economics*, 14(3): 375-397.

Kawachi I., Kennedy B. P., Lochner K. and Prothrow-Stith D. (1997). Social capital, income inequality, and mortality. *American journal of public health*, *87*(9): 1491-1498.

Kawachi I. and Kennedy B. P. (1997). The relationship of income inequality to mortality: does the choice of indicator matter? *Social science & medicine*, *45*(7): 1121-1127.

Knight F. H. (1922). Ethics and the economic interpretation. *The Quarterly Journal of Economics*, 454-481.

Korpi T. (1997). Is utility related to employment status? Employment, unemployment, labour market policies and subjective well-being among Swedish youth. *Labour economics*, *4*(2): 125-147.

Kuznets S. (1955). Economic growth and income inequality. *The American economic review*, 45: 1-28.

Lance C.E., Mallard A.G. and Michalos A.C. (1995). Tests of the causal directions of global-life facet satisfaction relationships. *Social Indicators Research*, 34(1): 69-92.

Layard R. (1980). Human satisfactions and public policy. *The Economic Journal*, 90: 737-750.

Layard R. (2003). *Has social science a clue? Income and happiness: Rethinking economic policy* (pp. 3-5). Lecture held at the Lionel Robbins memorial lecture series, March. London School of Economics.

Layard R. (2005a). Happiness: Lessons from a New Science. Penguin Press, New York.

Layard R. (2005b). Rethinking Public Economics: The Implications of Rivalry and Habit. *Economics and Happiness*, 147-170.

Lazear E. P. (1995). *Culture and language* (No. w5249). National Bureau of Economic Research.

Leech N. L., Barrett C. K. and Morgan A. G. (2008). *SPSS for intermediate statistics.*

Leigh A., Jencks C. and Smeeding T. (2009). Health and income inequality. The Oxford Handbook of Economic Inequality, 384-405.

Lelkes O. (2006a). Knowing what is good for you. Empirical analysis of personal preferences and the "objective good". *The Journal of Socio-Economics*, 35(2): 285-307.

Lelkes O. (2006b). Tasting freedom: Happiness, religion and economic transition. *Journal of Economic Behaviour and Organization*, 59(2):173-194.

Leibenstein H. (1950). Bandwagon, snob, and Veblen effects in the theory of consumers' demand. *The Quarterly Journal of Economics, 65:* 183-207.

Liao T. F. (1994). *Interpreting probability models: Logit, probit, and other generalized linear models* (No. 101). Sage.

Lindahl E. (1933).The Concept of Income, printed from Economics Essays in Honour of Gustav Cassel, London: Allen & Unwin, pp. 399-407, in R. H. Parker, G. C. Harcourt, and G. Whittington (eds.), Readings in The Concept and Measurement of Income, Philip Allan Publisher Ltd., Oxford, 1986.

Litchfield J., Reilly B. and Veneziani M. (2012). An analysis of life satisfaction in Albania: A heteroskedastic ordered probit model approach. *Journal of Economic Behavior & Organization*, 81(3): 731-741.

Lui H. K. (1997). *Income inequality and economic development* (Vol. 4). City University of Hong Kong Press.

Luttmer E. F. P. (2005). Neighbours as negatives: Relative earnings and well-being. *The Quarterly Journal of Economics*, 20(3): 963-1002.

Lynch J. W., Smith G. D., Kaplan G. A. and House J. S. (2000). Income inequality and mortality: importance to health of individual income, psychosocial environment, or material conditions. *BMJ: British Medical Journal*, 320 (7243): 1200.

Machin S. and Vignoles A. (2004). Educational inequality: the widening socio-economic gap. *Fiscal Studies*, *25*(2): 107-128.

Maddala G.S. (1983). *Limited dependent and qualitative variables in econometrics*. Cambridge University Press, Cambridge, UK.

Malan A. (2000). Changes in Income Distribution in South Africa: A Social Accounting Matrix Approach. 13th International Conference of Input-Output Techinques. Macerata, Italy.

Martínez R., Ayala L. and Ruiz-Huerta J. (2001). The impact of unemployment on inequality and poverty in OECD countries. *Economics of Transition*, *9*(2): 417-447.

McBride M. (2001). Relative-income effects on subjective well-being in the cross-section. *Journal of Economic Behaviour and Organization*, *45*(3): 251-278.

McGillivray M. and Clarke M. (Eds.). (2006). *Understanding human well-being*. Tokyo: United Nations University Press.

McKelvey R. D. and Zavoina W. (1975). A statistical model for the analysis of ordinal level dependent variables. *Journal of mathematical sociology*, *4*(1): 103-120.

McMurrer D. P. and Sawhill I. V. (1998). *Getting ahead: Economic and social mobility in America*. The Urban Insitute.

Meier S. and Stutzer A. (2008). Is volunteering rewarding in itself? *Economica*, *75*(297): 39-59.

Midwinter E. (2006). Age and Inequality. *The Political Quarterly*, *77*(s1): 109-115.

Morawetz D., Atia E., Bin-Nun G., Felous L., Gariplerden Y., Harris E. and Zarfaty Y. (1977). Income distribution and self-rated happiness: some empirical evidence. *The economic journal*, 511-522.

Morgan G. A., Leech N. L., Gloeckner G. W. and Barrett K. C. (2012). *IBM SPSS for introductory statistics: Use and interpretation*. Routledge.

Murphy D. C. (1985). Calculation of gini and theil inequality coefficients for Irish household incomes in 1973 and 1980. 225-249.

Mussagy I. H. (2014). The relationship between growth, poverty and income inequality: an assessment of the pro-poor growth of Sofala province during the period of 1996-7 and 2002-3.

Myers D. G. and Diener E. (1995). Who is happy? *Psychological science*, *6*(1): 10-19.

NG Y. K. (2008). Happiness Studies: Ways to Improve Comparability and Some Public Policy Implications*. *Economic Record*, *84*(265): 253 -266.

National Economic and Social Council (NESC), (2009). "Well-being Matters: A Social Report for Ireland". Volume 1, No. 119.

New Economic Foundation. (2009). National Accounts of Well-Being. London: New Economics Foundation [online]

Ngepah N. N. (2010). Energy, inequality and pro-poor growth in South Africa.

Nguyen J. K., Fleming C. M. and Su J. J. (2015). Does Income Inequality Make Us Less Happy? *Australian Economic Review*, *48*(1): 15-32.

Nolan B., Salverda W. and Smeeding T. M. (Eds.). (2011). *The Oxford handbook of economic inequality*. Oxford University Press.

O'Connell M. (2004). Fairly satisfied: Economic equality, wealth and satisfaction. *Journal of Economic Psychology*, *25*(3): 297-305.

Oliver J. M. and Burkham R. (1979). Depression in university students: Duration, relation to calendar time, prevalence, and demographic correlates. *Journal of Abnormal Psychology*, *88*(6): 667.

Osberg L. (1984). *Economic inequality in the United States* (Vol. 2). ME Sharpe.

Oswald A. (1997). Happiness and Economic Performance. *Economic Journal*, 107(445): 1815-1831.

Oswald A. J. and Powdthavee N. (2008). Does happiness adapt? A longitudinal study of disability with implications for economists and judges. *Journal of public economics*, *92*(5): 1061-1077.

Ostroot N. and Snyder W. (1985). Measuring cultural bias in a cross-national study. *Social Indicators Research,* 17(3): 234-251.

Pareto V. and Politique M. D. E. (1909). Paris: M.

Peiró A. (2006). Happiness, Satisfaction and Socio-economic Conditions: Some International Evidence. *Journal of Socio-Economics,* 35(2): 348-365.

Perotti R. (1996). Growth, income distribution, and democracy: what the data say. *Journal of Economic growth*, *1*(2): 149-187.

Persson T. and Tabellini G. (1991). *Is inequality harmful for growth? Theory and evidence* (No. w3599). National Bureau of Economic Research.

Pigou A. (1962). The Economics of Welfare, 4th edn. (Macmillan, London).

Pigou A. C. (1912). *Wealth and welfare*. Macmillan and Company, limited.

Piketty T. (1995). Social mobility and redistributive politics. *The Quarterly Journal of Economics*, 110: 551-584.

Plug E.J.S. (1997). *Leyden welfare and beyond.* Ph.D thesis, Amsterdam, Thesis Publishers.

Pourghadiri B. E. (2012). *Inequality and the rentier state: vertical and horizontal inequality patterns in Iran* (Doctoral dissertation, SOAS, University of London).

Pukeliene V. and Kisieliauskas J. (2013). The influence of income on subjective well-being. *Applied Economics: Systematic Research*, *7*(2).

Rehdanz K. and Maddison D. (2005). Climate and happiness. *Ecological Economics*, 52(1): 111-125.

Robinson B. R (2002). Income Inequality and Ethnicity: An International View. Second Inequality and Pro-Poor Growth. Washington D.C.: World Bank.

Robinson J. A. and Acemoglu D. (2002). The political economy of the Kuznets curve. *Review of development economics*, *6*: 183-203.

Robinson J. and Shaver P. (1969). Measures of social psychological attitudes (Appendix B to measures of political attitudes). Ann Arbor, Michigan: Survey Research Centre, Institute for Social Research.

Rogoff K. (1996). The purchasing power parity puzzle. *Journal of Economic literature*, *34*(2): 647-668.

Runciman W. G. (1966). Relative Deprivation and Social Justice, Reports of the Institute of Community Studies. Routledge and Kegan Paul, London, Boston and Henley.

Sacks D. W., Stevenson B. and Wolfers J. (2010). *Subjective well-being, income, economic development and growth* (No. w16441). National Bureau of Economic Research.

Sacks D., Stevenson B. and Wolfers J. (2013). "Growth in Subjective Well-being and Income over Time", mimeo.

Salway S., Platt L., Chowbey P., Harriss K. and Bayliss E. (2007). Long-term ill health, poverty and ethnicity.

Sandvik E., Diener E. and Seidlitz L. (1993). Subjective well-being: The convergence and stability of self-report and non-self-report measures. *Journal of Personality*, 61(3): 317-342.

Sanfey P. and Teksoz U. (2007). Does transition make you happy? *The Economics of Transition*, 15(4): 707-731.

Saris W. E., Veenhoven R., Scherpenzeel A. C. and Bunting B. (1996). *A comparative study of satisfaction with life in Europe*. Eotvos University Press. ISBN 963 463 081 2: 254-262.

Sarracino F. (2013). Determinants of subjective well-being in high and low income countries: Do happiness equations differ across countries? *The Journal of Socio-Economics*, 42: 51-66.

Schultz T. W. (1961). Investment in human capital. *The American economic review*, 1-17.

Schütz G., Ursprung H. W. and Wößmann L. (2008). Education policy and equality of opportunity. *Kyklos*, *61*(2): 279-308.

Seligman M. E. (2004). *Authentic happiness: Using the new positive psychology to realize your potential for lasting fulfilment*. Simon and Schuster.

Sen A. (1973). *On economic inequality*. Oxford University Press.

Senik C. (2004). Income distribution and well-being: What can we learn from subjective data? *Journal of Economic Surveys*, 19(1): 43-63.

Senik C. (2005). Income distribution and well-being: what can we learn from subjective data? *Journal of Economic Surveys*, *19*(1): 43-63.

Senik C. (2008). Ambition and jealousy: Income interactions in the 'Old' Europe versus the 'New' Europe and the United States. *Economica*, *75*(299): 495-513.

Shankar R. and Shah A. (2003). Bridging the economic divide within countries: A scorecard on the performance of regional policies in reducing regional income disparities. *World Development*, *31*(8): 1421-1441.

Shi L. and Sai D. (2013). An empirical analysis of income inequality between a minority and the majority in urban China: The case of Ningxia Hui autonomous region. *The Review of Black Political Economy*, *40*(3): 341-355.

Shields M.A. and Price S.W. (2005). Exploring the Economic and Social Deter minants of Psychological Well-Being and Perceived Social Support in England. *Journal of the Royal Statistical Society*, 168(3): 513-37.

Shields M. A. and Wailoo A. (2002). Exploring the determinants of unhappiness for ethnic minority men in Britain. *Scottish Journal of Political Economy*, *49*(4): 445-466.

Silver R. L. (1982). *Coping with an undesirable life event: A study of early reactions to physical disability* (Doctoral dissertation, Northwestern University).

Simons H. C. (1938). *Personal income taxation: The definition of income as a problem of fiscal policy*. University of Chicago Press.

Soubbotina T. P. and Sheram K. (2000). *Beyond economic growth: Meeting the challenges of global development*. World Bank Publications.

Stark W. and Bentham J. (1952). *Jeremy Bentham's Economic Writings; Critical Edition Based on His Printed Works and Unprinted Manuscripts. 2 Vols*. George Allen & Unwin, for Royal Economic Society.

Stevens S.S. (1946). On the theory of scales of measurement. *Science,* 103: 677-680.

Stevenson B. and Wolfers J. (2008). *Economic growth and subjective well-being: Reassessing the Easterlin paradox* (No. w14282). National Bureau of Economic Research.

Stevenson B. and Wolfers J. (2013). Subjective well-being and income: Is there any evidence of satiation? *American Economic Review,* 103: 598-604.

Stewart F. (2000). Income Distribution and Development. Queen Elizabeth House, University of Oxford.

Stewart M.B.(2004). Semi-nonparametric estimation of extended ordered probit models. *The Stata Journal.* 4(1): 27-39.

Stewart F., Brown G. and Cobham A. (2009). The Implications of Horizontal and Vertical Inequalities for Tax and Expenditure Policies. University of Oxford.

Stigler G. J. (1950). The development of utility theory. II. *The Journal of Political Economy,* 373-396.

Strunk M. (1949). The quarter's polls. *Public Opinion Quarterly,* 13(1): 154-176.

Stutzer A. (2004). The role of income aspirations in individual happiness. *Journal of Economic Behaviour and Organisation*, 54(1): 89-109.

Stutzer A. and Frey B. S. (2006). Does marriage make people happy, or do happy people get married? *The Journal of Socio-Economics*, *35*(2): 326-347.

Sullivan C. (2011). Ethnicity and Income Inequality in China. Population Association of America's Annual Conference.

Syafitri W. (2013). Determinants of labour migration decisions: The case of East Java, Indonesia. *Bulletin of Indonesian Economic Studies*, *49*(3): 385-386.

Tao H. L. and Chiu S. Y. (2013). Income growth, redistribution, and subjective well-being in Taiwan - a simulation study. *Applied Economics*, *45*(6): 775-791.

Taylor A. M. and Taylor M. P. (2004). *The purchasing power parity debate* (No. w10607). National Bureau of Economic Research.

Theil H. (1967). *Economics and information theory* (Vol. 7). Amsterdam: North-Holland.

Theil H. (1972). Statistical decomposition analysis. edited by Henri Theil. Amsterdam: North-Holland Publishing Company.

Theil H. and Finizza A. J. (1971). A note on the measurement of racial integration of schools by means of informational concepts. The Journal of Mathematical Sociology, 1(2):187-93.

Tomes N. (1986). Income distribution, happiness and satisfaction: A direct test of the interdependent preferences model. *Journal of Economic Psychology*, 7(4): 425-446.

Tov W. and Diener E. (2013). Culture and subjective well-being. *Available at SSRN 2199219.*

Tóthová S. (2011). *Income inequality and redistribution in Europe* (No. 573). LIS Working Paper Series.

Urry H. L., Nitschke J. B., Dolski I., Jackson D. C., Dalton K. M., Mueller C. J., Rosenkranz M. A., Ryff C. D., Singer B. H. and Davidson R. J. (2004). Making a life worth living: Neural correlates of well-being. *Psychological Science,* 15(6): 367-372.

Van den Berg B. and Ferrer-i-Carbonell A. (2007). Monetary valuation of informal care: the well-being valuation method. *Health economics*, *16*(11): 1227-1244.

Van de Stadt H., Kapteyn A. and Van de Geer S. (1985). The relativity of utility: Evidence from panel data. *The Review of Economics and Statistics*, 67: 179-187.

Van Deurzen I. (2015).The income inequality thesis revisited. Studies on the relationship between income inequality and well-being.

Van Hemert D. A., Van De Vijver F. J. and Poortinga Y. H. (2002). The Beck Depression Inventory as a measure of subjective well-being: A cross-national study. *Journal of Happiness Studies*, *3*(3): 257-286.
Van Praag B.M.S., Frijters P. and Ferrer-i-Carbonell A. (2003). The anatomy of subjective well-being. *Journal of Economic Behaviour and Organization*, 51(1):29-49.

Veblen T. (1909). The limitations of marginal utility. *The Journal of Political Economy*, *17*(9): 620-636.

Veenhoven R. (1989). *National Wealth and Individual Happiness*. In Klaus G.Grunert and Folke Olander, eds., Understanding Economic Behaviour, Dordrecht, Netherlands: Kluwer, 9-32.

Veenhoven R. (1991). Is happiness relative? *Social indicators research*, *24*(1): 1-34.

Veenhoven R. (1994). Is happiness a trait? *Social indicators research*, *32*(2): 101-160.

Veenhoven R. (1999). Quality-of-life in individualistic society. *Social Indicators Research, 48*(2): 159-188.

Veenhoven R. and Ehrhardt J. (1995). The Cross-National Pattern of happiness: Test of Predictions Implied in Three Theories of Happiness. *Social Indicators Research*, 34(1): 33-68.

Vendrik M. C. and Woltjer G. B. (2007). Happiness and loss aversion: Is utility concave or convex in relative income? *Journal of Public Economics, 91*(7): 1423-1448.

Verbeek M. (2002). *A guide to modern econometrics*. England: Wiley.

Verme P. (2011). Life satisfaction and income inequality. *Review of Income and Wealth, 57*(1): 111-127.

Verme P., Milanovic B., Al-Shawarby S., El Tawila S., Gadallah M. and El-Majeed E. A. A. (2014). *Inside Inequality in the Arab Republic of Egypt: Facts and Perceptions across People, Time, and Space*. World Bank Publications.

Wilson C. M. and Oswald A. J. (2005). How does marriage affect physical and psychological health? *The Warwick Economics Research Paper Series, University of Warwick, Department of Economics*.

Winkelmann R. (2005). Subjective well-being and the family: Results from an ordered probit model with multiple random effects. *Empirical Economics, 30*(3): 749-761.

Winkelmann L. and Winkelmann R. (1998). Why are the unemployed so unhappy? Evidence from panel data. *Economica, 65*(257): 1-15.

Wooldrige J. (2010). *Econometric analysis of cross section and panel data*. MIT press.

Wooldridge J. (2015). *Introductory econometrics: A modern approach*. Nelson Education.

Wottiez I. and Theeuwes J. (1998). *Well-being and labour market status.* In Jenkins S.P., Kapteyn A. and Van Praag B. M. S. (eds.).The Distribution of Welfare and Household Production: International Perspectives, pp. 211-30. Cambridge: Cambridge University Press.

Yitzhaki S. (1979). Relative Deprivation and the Gini Coefficient. *The Quarterly Journal of Economics,* 93(2): 321-324.

Zagorski K., Evans M. D., Kelley J. and Piotrowska K. (2014). Does National Income Inequality Affect Individuals' Quality of Life in Europe? Inequality, Happiness, Finances, and Health. *Social indicators research,* 117(3): 1089-1110.

APPENDIX

Table A1: Glossary of Terms Used in this Thesis

Word	Definition
Absolute income	Total amount of income received in a given period by a household or nation.
Economic development	An increase in the GDP that an economy produces over a period of time.
Happiness	A relatively short-term, situation dependent expression of mood.
Household/individual income	A monetary sum of all wages, salaries, pensions and other incomes that are received by a household after taxes and other deductions.
Income distribution	Who receives how much income within a specific society.
Income inequality	A measure of income division, or dispersion within a particular nation.
Inequality	Social or economic disparity between individuals or groups.
Life satisfaction	A long-term stable evaluation of one's life.
National income	GDP per capita based on PPP.
Poor economies/nations	Economies/nations with per capita income of less than $15,000.
Poor individuals	Individuals/households with annual household income of less than $15,000.
Reference group	All individuals who are living in the same region, possess the same education level and are in the age range of five years younger and five years older than the individual concerned.
Reference income	The average income of one's reference group.
Relative income	The distance between one's own income to the income of a reference group.
Rich economies/nations	Economies/nations with per capita income in excess of $15,000.
Rich individuals	Individuals/households with annual household income in excess of $15,000.
Satiation point	The income threshold level after which raising income no longer results in greater well-being.
Subjective well-being	An individual's evaluation of its own well-being.
Well-being	An individual's positive evaluation of their life including positive emotion, engagement, satisfaction, and meaning.

(*Source: Author's own****)***

Table A1.1: List of Abbreviations Used in this Thesis

Abbreviation	Definition
AIPO	American Institute of Public Opinion
BUC	Blow-Up and Cluster
CBOS	Centrum Badania Opinii Społecznej
CIA	Central Intelligence Agency
EU	European Union
EVS	European Values Study
GDP	Gross Domestic Product
GNP	Gross National Product
ICPSR	Inter-Niversity Consortium for Political and Social Research
IMF	International Monetary Fund
ISSP	International Social Survey Programme
NESC	National Economic and Social Council
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PPP	Purchasing Power Parity
PSU	Primary Sampling Units
UNESCO	United Nations Educational, Scientific and Cultural Organisation
US	United States
USA	United States of America

(Source: Author's own)

Table A2.2.1: Equation Specification and Results for Studies on Within Nation Well-Being and Individual Income

Study	Data Set	Technique	Well-Being Variable	Income Variable	Well-Being-Income Relation
Easterlin, (1974)	American AIPO Poll data of December 1970	Cross tabulation	Happiness	Six income groups ranging from less than 3,000 to more than 15,000	Positive well-being-income relationship
Clark and Oswald, (1994)	British Household Panel Study	Ordered probits	Scores from the general health questionnaire section of the survey	ns	Experiments with income as a regressor proved inconclusive. Robust income well-being effects were not found
Easterlin, (1995)	Citation from Diener, (1984: 553)	ns	Subjective well-being	ns	Overwhelming evidence that shows a positive relationship between subjective well-being and income within countries. This relationship exists even when other variables such as education are controlled for
Easterlin, (2001)	General Social Survey	Cross tabulation	Happiness	Seven income groups ranging from less than 10,000 to more than 75,000	A significant positive bivariate relationship between happiness and income
Di Tella *et al.*, (2001)	Euro-Barometer Survey Series	OLS regressions	Life satisfaction	Income quartiles	Statistically significant positive well-being-income association. Greater family income increases the likelihood that a respondent reports a high level of well-being
Blanchflower and Oswald, (2004a)	General Social Surveys 1972 - 1998 (fifteen hundred individuals per annum in the United States)	Ordered logits	Happiness	Income per capita in the household	Money buys happiness

(Source: Author's own. ns = not stated)

Table A2.2.1 continued: Equation Specification and Results for Studies on Within Nation Well-Being and Individual Income

Study	Data Set	Technique	Well-Being Variable	Income Variable	Well-Being-Income Relation
Peiró, (2006)	World Values Survey, 1995 - 1996	Ordered logit	Happiness and life satisfaction	Five income quintiles	Positive well-being-income relationship
Stevenson and Wolfers, (2008)	General Social Survey United States: 1972 - 2006 data	Ordered probit	Happiness	Family income, is converted from income categories to income by fitting interval regressions to the income data by assuming that income follows a log-normal distribution	Linear-log relationship between our happiness index and family income is clearly evident throughout the income distribution
Stevenson and Wolfers, (2008)	Gallup World Poll	Ordered probit	Life satisfaction	Log of household income	Linear relationship between subjective well-being and the log of family income
Sacks *et al.*, (2010)	Gallup World Poll (126 nations)	OLS regression	Ladder question (Position on a ten-step ladder - top of the ladder = best possible life and the bottom = worst possible life)	Log of household income	Richer individuals in a given country are more satisfied with their lives than are poor individuals. This relationship is similar in most countries around the world
Sacks *et al.*, (2010)	World Values Survey (61 nations)	OLS regression	Life satisfaction	Log of household income	Positive well-being-income relationship
Sacks *et al.*, (2010)	Pew Global Attitudes Survey (43 nations)	OLS regression	Ladder question	Log of household income	Positive well-being-income relationship
Stevenson and Wolfers, (2013)	Gallup Poll December 2007	Cross tabulation	Happiness	11 income groups ranging from less than 10,000 to more than 500,000	The positive association between reported well-being and family income is remarkably consistent

(Source: Author's own)

Table A2.3.1: Equation Specification and Results for Studies on Well-Being and National Income

Study	Data Set	Technique	Well-Being Variable	Income Variable	Well-Being-Income Relation
Inglehart, (1990)	Eurobarometer surveys (12 nations)	Scatter plot of mean national well-being levels and income	Life satisfaction	GNP	Positive well-being-income relationship
Easterlin, (1995)	From lnglehart 1988, based on Euro-Barometer surveys 1984 (24 nations)	Ordinary least squares regression	Life satisfaction	General and real gross national product per capita	Positive well-being-income relationship
Frey and Stutzer, (2002a)	1990-1993/ 1995-1997 World Values Survey	Scatter plot of mean national well-being levels and income	Life satisfaction	GNP per capita in PPP 1995 US$	Positive concave well-being-income relationship
Helliwell, (2003)	1980-1982/1990-1991/ 1995-1997 World Values Survey	Ordered probit regression	Life satisfaction	Log real GDP per capita, measured at PPP	Positive well-being-income relationship for low income nations. Small and insignificant well-being effects of living in higher income nations
Di Tella *et al.*, (2003)	Eurobarometer Survey Series 1975 - 1992 (12 nations)	Ordered probit regression	Life satisfaction	GDP per capita	Positive well-being-income relationship
Blanchflower and Oswald, (2004a)	General Social Surveys 1972 - 1998 (fifteen hundred individuals per annum in the United States)	Ordered logits	Happiness	Log state income per capita	Positive well-being-income relationship

(Source: Author's own)

Table A2.3.1 continued: Equation Specification and Results for Studies on Well-Being and National Income

Study	Data Set	Technique	Well-Being Variable	Income Variable	Well-Being-Income Relation
Deaton, (2008)	Gallup World Poll 2006 (123 nations)	ns	Position on a ten-step ladder (top of the ladder represents the best possible life and the bottom represents the worst possible life)	Log GDP per capita at PPP	Positive well-being-income relationship
Stevenson and Wolfers, (2008)	Gallup World Poll 2006 (113 nations)	OLS regression and ordered probit regression	Ladder Question	Log GDP per capita at PPP	Positive well-being-income relationship
Stevenson and Wolfers, (2008)	1981-1984 World Values Survey wave (19 nations)	OLS regression and ordered probit regression	Life satisfaction and happiness	Log GDP per capita at PPP	Positive well-being-income relationship
Stevenson and Wolfers, (2008)	1989-1993 World Values Survey wave (35 nations)	OLS regression and ordered probit regression	Life satisfaction and happiness	Log GDP per capita at PPP	Positive well-being-income relationship
Stevenson and Wolfers, (2008)	1994-1999 World Values Survey wave (67 nations)	OLS regression and ordered probit regression	Life satisfaction and happiness	Log GDP per capita at PPP	Positive well-being-income relationship
Stevenson and Wolfers, (2008)	1999-2004 World Values Survey wave (79 nations)	OLS regression and ordered probit regression	Life satisfaction and happiness	Log GDP per capita at PPP	Positive well-being-income relationship
Stevenson and Wolfers, (2008)	The Pew Global Attitudes Survey 2002 (44 nations)	OLS regression and ordered probit regression	Ladder question	Log GDP per capita at PPP	Positive well-being-income relationship

(Source: Author's own. ns= not stated)

Table A2.3.1 continued: Equation Specification and Results for Studies on Well-Being and National Income

Study	Data Set	Technique	Well-Being Variable	Income Variable	Well-Being-Income Relation
Sacks *et al*., (2010)	Gallup World Poll (131 nations)	OLS regression	Ladder question	Log GDP per capita at PPP	Positive well-being-income relationship
Sacks *et al*., (2010)	World Values Survey (79 nations)	OLS regression	Life satisfaction	Log GDP per capita at PPP	Positive well-being-income relationship
Sacks *et al*., (2010)	Pew Global Attitudes Survey (44 nations)	OLS regression	Ladder question	Log GDP per capita at PPP	Positive well-being-income relationship
Stevenson and Wolfers, (2013)	Gallup World Poll 2005-2012	OLS regressions	Life satisfaction and satisfaction ladder	Log GDP per capita at PPP US$	Positive well-being-income relationship for rich and poor nations
Stevenson and Wolfers, (2013)	1981-1984/ 1989-1993/ 1994-1999/ 2000-2004/ 2005-2009 World Values Survey wave	OLS regressions	Life satisfaction and happiness	Log GDP per capita at PPP US$	Positive well-being-income relationship for rich and poor nations
Stevenson and Wolfers, (2013)	The Pew Global Attitudes Survey 2002/2007/2010	OLS regressions	Satisfaction ladder	Log GDP per capita at PPP US$	Positive well-being-income relationship for both rich and poor nations
Stevenson and Wolfers, (2013)	ISSP 2008/2007/2001/1998/1991	OLS regressions	Happiness	Log GDP per capita at PPP US$	Positive well-being-income relationship for both rich and poor nations
Sarracino, (2013)	World Values Survey (over 80 nations)	OLS, ordered logit and ordered probit regression	Happiness and life satisfaction	Log gross national income per capita	Positive concave well-being-income relationship for rich and poor nations

(Source: Author's own)

Table A2.4.2: Equation Specification and Results for Studies on Well-Being and National Income Inequality

Study	Data Set	Technique	Well-Being Variable	Inequality Variable	Well-Being-Income-Inequality Relationship
Morawetz *et al.,* (1977)	Ad-hoc questionnaire in two villages in Israel	ns	Happiness and life satisfaction	Comparison of an equal and unequal society	Society with lower income inequality has higher happiness
Helliwell, (2003)	World Values Survey 1980 - 1982; 1990 - 1991; 1995 - 1997 waves	Ordered probit	Life satisfaction	Gini coefficient (World Bank)	Gini non-significant (results not in tables but quoted in text)
Clark, (2003)	British Household Panel Survey 1991 - 2002	Ordered probit	Life satisfaction and the GHQ-12 INDEX (self-completed questionnaire of twelve psychological questions)	Gini coefficient	Gini positive non-significant at the regional levels
Blanchflower and Oswald, (2003)	General Social Survey 1976 - 1996	Ordered logit	Happiness	Earnings inequality (the ratio of the mean of 5th quintile earnings to 1st quintile earnings)	Gini negative and moderate in size
Alesina *et al.*, (2004)	United States General Social Survey 1972-1997	Ordered logit	Happiness	Gini coefficient	Gini negative and significant in 6 of the 13 equations
Alesina *et al.*, (2004)	Euro-Berometer Survey Series 1975-1992	Ordered logit	Happiness	Gini coefficient	Gini negative and significant in 7 of the 13 equations
Senik, (2004)	Russian Longitudinal Monitoring Survey 1994-2000	Ordered probit	Life satisfaction	Gini coefficient and stark indices of income overhang (national, regional and PSU level)	Gini positive non-significant at all levels

(Source: Author's own. ns= not stated)

Table A2.4.2 continued: Equation Specification and Results for Studies on Well-Being and National Income Inequality

Study	Data Set	Technique	Well-Being Variable	Inequality Variable	Well-Being-Income-Inequality Relationship
O'Connell, (2004)	Eurobarometer surveys 1995 - 1998	Linear regression modelling	Life satisfaction	Eurostat's income distribution: ratio of the total income received by the 20 % of the country's population with the highest total income (top quintile) to that received by the 20% with the lowest total income (lowest quintile). Higher scores indicate greater inequality	Statistical significant negative association between income inequality and mean well-being levels
Graham and Felton, (2005)	Latinobarómetro organization 1997-2004: 17 Latin American nations	Ordered logit	Life satisfaction	Gini coefficient	The lowest well-being is found in high income inequality nations, followed by low income inequality nations. the highest well-being is found in medium inequality nations
Graham and Felton, (2006)	Latinobarómetro organization 2004: 16 Latin American nations	Ordered logit	Life satisfaction	Gini coefficient	Gini non-significant (description of results in text not in tables)
Sanfey and Teksoz, (2007)	World Values Survey 1990 - 93; 1995 - 97; 1999 - 2002 wave	Clustered linear regressions	Life satisfaction	Gini coefficient	Gini negative for individuals in transition nations and positive in non-transition nations

(Source: Author's own)

Table A2.4.2 continued: Equation Specification and Results for Studies on Well-Being and National Income Inequality

Study	Data Set	Technique	Well-Being Variable	Inequality Variable	Well-Being-Income-Inequality Relationship
Ferrer-i-Carbonell and Ramos, (2010)	German Socio-Economic Panel	Regressions with individual fixed effects and random effects	Life satisfaction	Gini coefficient	Gini negative
Grosfeld and Senik, (2010)	CBOS in Poland	Ordered logit	Life satisfaction	Gini coefficient (Central Statistical office)	In the initial stage of the transition process, a rise in income inequality is interpreted as a positive signal of wider opportunities. Later increased inequality became a factor in dissatisfaction with the nation's economic situation
Carr, (2013)	General Social Survey data 1998-2008 connected to Census data	OLS and multilevel linear probability model	Happiness	Gini coefficient	Positive Gini at the census tract level. Negative Gini found at the county level
Tao and Chiu, (2013)	The Taiwan Social Change Survey 2001	Ordered probit	Happiness	Gini coefficient	Significant negative Gini in the whole sample. Deteriorations in the income distribution hurt the poor and the middle income groups but benefit the rich

(*Source: Author's own)*

Table A2.4.2 continued: Equation Specification and Results for Studies on Well-Being and National Income Inequality

Study	Data Set	Technique	Well-Being Variable	Inequality Variable	Well-Being-Income-Inequality Relationship
Nguyen *et al.*, (2015)	The Household, Income and Labour Dynamics in Australia 2001-2009	Polled ordered logit/ linear fixed effects/ordered logit with fixed effects using the BUC estimator	Life satisfaction	Gini coefficient for household incomes within each geographical area in Australia	Gini negative and significant found in the whole sample. Gini negative and significant found in the rich sample. Gini negative and non-significant found in the poor sample

(Source: Author's own)

Table A2.4.3.2.2: The Determenents of Individual Happiness and Life Satisfaction using the Theil Index as the Measure of Income Inequality

Well-Being-Data	**βall and z-stat (1)**	**β_{rich} and z-stat (2)**	**β_{poor} and z-stat (3)**
Theil	-14.825*** (-15.70)	-15.188*** (-13.25)	-16.129*** (-7.98)
Model Summary			
Observations	55226	26718	28508
LR chi2	13915.79	6153.51	4940.36
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R2	0.0595	0.0595	0.0392
Log likelihood	-109978.04	-48638.065	-60543.52
Happiness data			
Theil	-24.351*** (-22.65)	-25.222*** (-19.03)	-20.680*** (-9.17)
Model Summary			
Observations	54893	26592	28301
LR chi2	16320.30	5956.40	6751.50
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R2	0.1432	0.1214	0.1108
Log likelihood	-48810.972	-21557.99	-27094.566

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table A3.3: European Values Study Description - Ireland 2008

Universe:	Persons 18 years or older who are resident within private households, regardless of nationality, citizenship or language
Fieldwork period:	07-06-2008 to 31-08-2008
Number of variables:	441
Language of the interviews:	English
Total number of issued sample units (addresses, households or individuals):	2152
Refusal by respondent:	533
Refusal by proxy (or household or address refusal):	276
No contact (after at least 4 visits):	0
Language barrier:	69
Respondent mentally or physically unable to co-operate throughout fieldwork period:	31
Respondent unavailable through the fieldwork for other reasons:	187
Address not residential (institution, business/industrial purpose):	6
Address not occupied (not occupied, demolished, not yet built):	33
Address not traceable:	1
Other ineligible address:	0
Respondent moved abroad/unknown destination:	0
Respondent deceased:	0
Invalid interviews:	4
Number of valid interviews:	1013
Data depositor and fieldwork organisation:	TNS mrbi, Temple House, Temple Road, Blackrock, Co. Dublin, Ireland
Categories in the variable Region:	Border - Midland - West - Dublin - Mid-East - Mid-West - South-East - South-West
Program director:	Dr. Micheal Breen Caillin Reynolds University of Limerick, Department of Media and Communication
Total number of interviewers:	66
Funding Agency:	EVS, EVS Foundation, Department of Sociology Tiburg University St. Stephen's Green Trust
Total number of experienced interviewers who received specific training for EVS survey:	66

(Source: Author's own)

Table A3.4: European Values Study Description - Europe 2008

Study description:	The EVS is a large-scale, cross-national survey research program which concerns itself with human values. The EVS has been conducted in 1981 (16nations), 1990 (29 nations), 1999/2000 (33nations), and 2008 (47nations)
Authoring entity:	European Values Study at Tilburg University
Data distributor:	GESIS - Leibniz Institute for the Social Sciences, Data Archive Bachemer Str. 40, 50931 Köln, Germany; Postal address: Postfach 41 09 60, 50869 Köln, Germany Phone: +49/(0)221/47694-0; Fax: +49/(0)221/47694-44 GESIS Web: http://www.gesis.org/ EVS Web: http://www.europeanvaluesstudy.eu/
Unit of analysis:	Individuals
Kind of data:	Survey data
Time period covered:	2008 - 2010
Universe:	The selection method included representative multi-stage or stratified random samples of the adult population of individuals 18 years and older who were residents of a private household irrespective of their nationality, citizenship or language in 47nations. Exceptions are Armenia where individuals aged 15 years and older and Finland where individuals aged 18 to 74 years were drawn. Respondents were required to have obtained sufficient command of one of the respective national languages. Those interviewed had sufficient command of one of the respective national language(s) in order to complete the questionnaire
Time method:	Cross section, partly repetitive
Number of variables:	445
Topic classification:	Moral, religious, societal, political, work and family values of European citizens
Language of the interviews:	Azerbaijan - Azerbaijani, Russian Belgium - Flemish (Dutch), French Estonia - Estonian, Russian Georgia - Georgian, Russian Kosovo - Albanian, Serbian Latvia - Latvian, Russian Luxembourg- Luxembourgish, German, French, Portuguese, English Macedonia - Macedonian, Albanian Malta - Maltese, English Moldova - Moldovan, Russian Romanian - Romanian, Hungarian Slovakia - Slovak, Hungarian Switzerland- German, French, Italian Ukraine - Ukrainian, Russian Albanian - Albania, Kosovo, Macedonia Dutch/Flemish - Belgium, The Netherlands English - Great Britain, Ireland, Luxembourg, Malta, Northern Ireland French - Belgium, France, Luxembourg, Switzerland German - Austria, Germany, Luxembourg, Switzerland Greek - Cyprus, Greece Hungarian - Hungary, Romania, Slovakia Italian - Italy, Switzerland Portuguese - Luxembourg, Portugal Russian - Azerbaijan, Belarus, Estonia, Georgia, Latvia, Moldova, Russia, Ukraine Serbian - Kosovo, Serbia Turkish - Northern Cyprus, Turkey

(Source: Author's own)

Table A3.4 continued: European Values Study Description - Europe 2008

Number of units:	67786
Questionnaire translation:	The translation process was standardised according to stringent guidelines set out by a Methodology Group. To enable the harmonization of translation of the 2008 questionnaire, the English basic questionnaire was translated by "WebTrans", a web-based translation system designed by Gallup Europe. The translation process was carefully monitored and quasi-automated documented (see EVS (2010): EVS 2008 Guidelines and Recommendations. GESIS-Technical Reports 2010/16. Retrieved from http://www.europeanvaluesstudy.eu/) (EVS, 2011)
Sampling procedure:	The selection method included representative multi-stage or stratified random samples of the adult population of individuals 18 years and older. Exceptions are Armenia where individuals aged 15 years and older and Finland where individuals aged 18 to 74 years were drawn. The net sample size of completed interviews is 1500 per nation. Exceptions include Northern Cyprus and Northern Ireland (500 interviews each), Iceland (808 interviews), Cyprus (1000 interviews), Ireland (1013 interviews), Norway (1090 interviews), Finland (1134 interviews), Sweden (1187 interviews), Switzerland (1272 interviews) France (random sample of 1501, two additional quota samples of 1570 interviews), Germany (East: 1004 interviews, West: 1071 interviews)
Mode of data collection:	Between 2008 and 2010 face-to-face interviews were conducted with standardised questionnaires. Exceptions are Finland, where internet panels and Sweden, where postal surveys were used. In all nations, fieldwork was conducted aboding with the detailed and uniform instructions formed by the EVS advisory groups
Anonymised data:	Only anonymised data is available to users. This is in accordance with the regulations concerning data in each participating nation. Each national team had the responsibility of insuring data confidentiality before making data available
Fieldwork period:	Albania: 10-07-2008 to 09-09-2008 Armenia: 16-06-2008 to 19-09-2008 Austria: 21-07-2008 to 22-10-2008 Azerbaijan: 11-07-2008 to 10-08-2008 Belarus: 11-06-2008 to 31-07-2008 Belgium: 30-04-2009 to 02-08-2009 Bosnia- Herzegovina: 12-07-2008 to 31-07-2008 Bulgaria: 21-04-2008 to 15-06-2008 Croatia: 31-04-2008 to 31-10-2008 Cyprus: 25-10-2008 to 28-11-2008 Czech Republic: 05-05-2008 to 02-11-2008 Denmark: 01-04-2008 to 15-09-2008 Estonia: 01-07-2008 to 31-08-2008 Finland: 09-07-2009 to 15-07-2009 France: 07-05-2008 to 04-09-2008 Georgia: 21-08-2008 to 30-09-2008 Germany: 17-09-2008 to 10-02-2009 Great Britain: 01-08-2009 to 10-03-2010 Greece: 12-09-2008 to 26-10-2008 Hungary: 26-11-2008 to 28-01-2009 Iceland: 15-07-2009 to 15-03-2010 Ireland: 07-06-2008 to 31-08-2008 Italy: 02-10-2009 to 30-12-2009 Kosovo: 15-07-2008 to 13-10-2008 Latvia: 01-06-2008 to 31-10-2008 Lithuania: 21-07-2008 to 25-08-2008 and 03-08-2008 to 14-09-2008 Luxembourg: 03-05-2008 to 15-12-2008 Macedonia: 03-07-2008 to 13-10-2008 Malta: 16-06-2008 to 23-09-2008

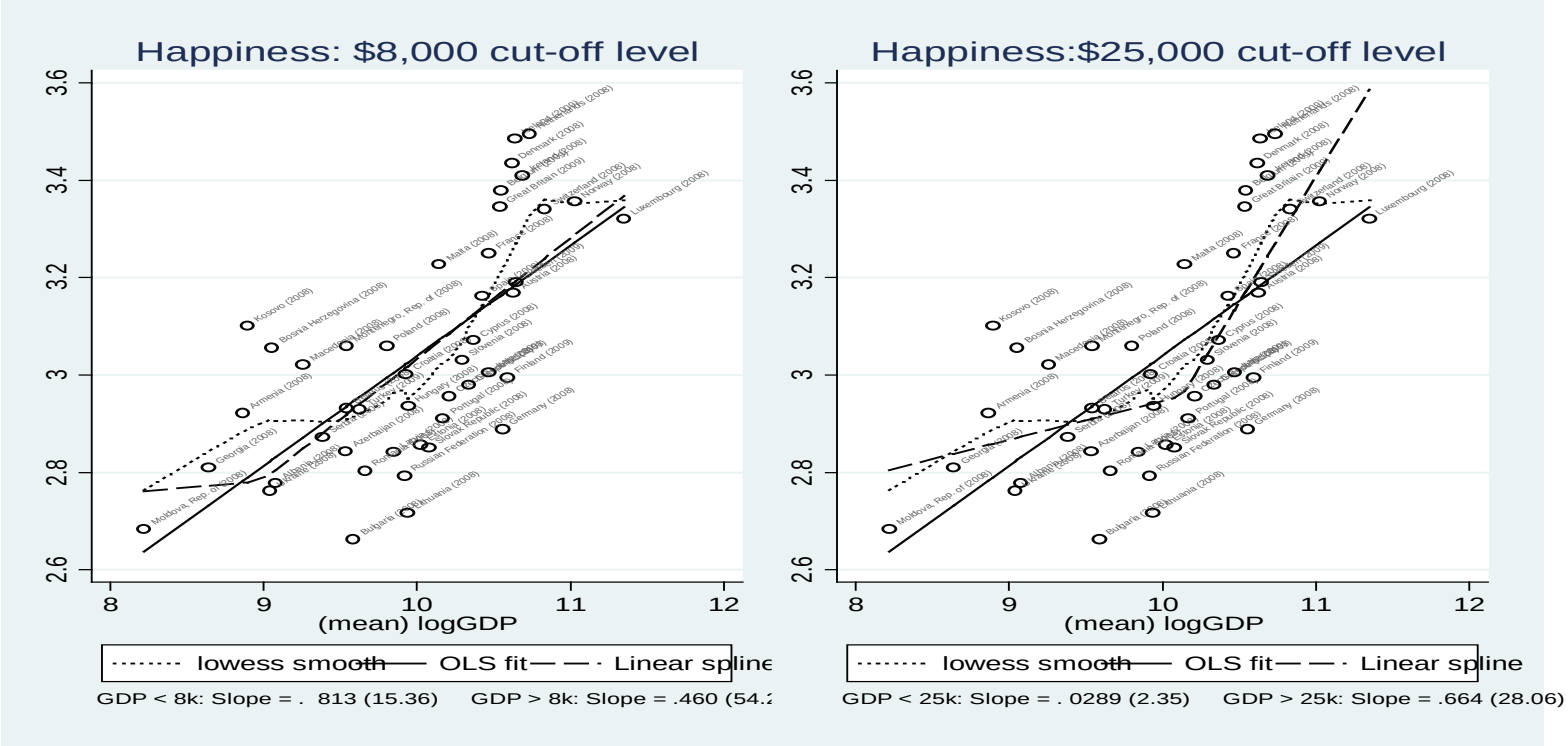
(Source: Author's own)

Table A3.4 continued: European Values Study Description - Europe 2008

Fieldwork period:	Moldova: 02-07-2008 to 04-10-2008 Montenegro: 12-11-2008 to 08-12-2008 Netherlands: 21-05-2008 to 31-10-2008 Northern Cyprus: 28-10-2008 to 04-12-2008 Northern Ireland: 26-09-2008 to 23-10-2008 Norway: 07-04-2008 to 02-09-2008 Poland: 27-06-2008 to 28-09-2008 Portugal: 26-05-2008 to 31-08-2008 Romania: 24-04-2008 to 30-06-2008 Russian Federation: 28-06-2008 to 26-07-2008 Serbia: 14-07-2008 to 31-07-2008 Slovak Republic: 14-07-2008 to 29-08-2008 Slovenia: 27-03-2008 to 18-06-2008 Spain: 28-05-2008 to 15-07-2008 Sweden: 25-09-2009 to 10-01-2010 Switzerland: 08-05-2008 to 06-10-2008 Turkey: 26-11-2008 to 01-03-2009 Ukraine: 12-07-2008 to 09-10-2008

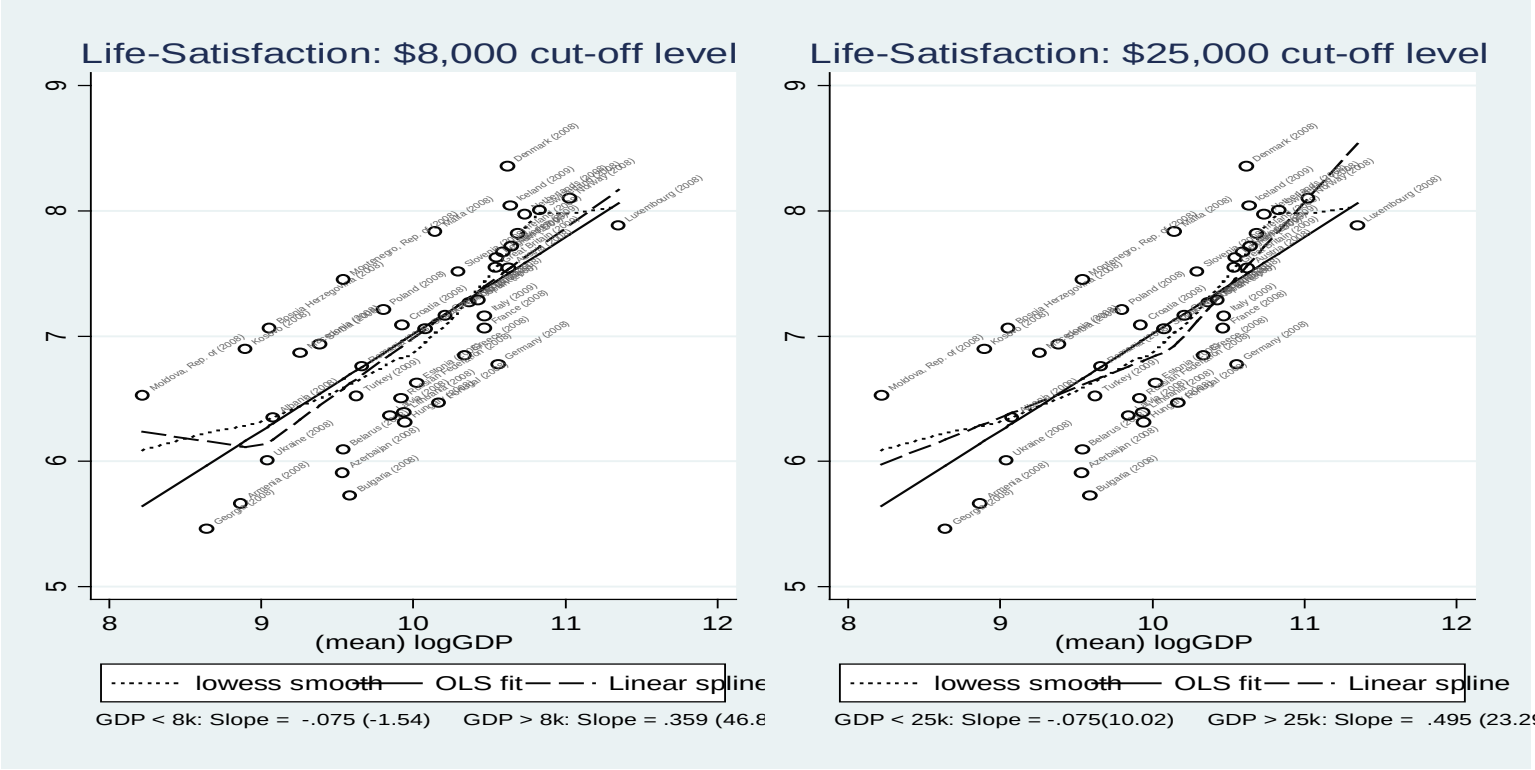
(Source: Author's own)

Figure A5.2.1: Non-Parametric Fit of the Happiness-LogGDP Data



(Source: Author's own)

Figure A5.2.2: Non-Parametric Fit of the Life-Satisfaction-LogGDP Data



(Source: Author's own)

Table A5.3.1: Cross National Evidence of a Satiation Point in the Well-Being-Income Relationship, Ordered Probit Results with a Cut-Off Level of Per Capita GDP of $8,000

Well-Being-Data	βall and z-stat (1)	β_{rich} and z-stat (2)	β_{poor} and z-stat (3)
Life satisfaction data			
logGDP	0.098*** (10.66)	0.248*** (29.41)	0.302*** (-5.85)
Model Summary			
Observations	66221	60139	6082
LR chi2	16043.66	14916.05	949.04
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R2	0.0575	0.0594	0.0348
Log likelihood	-131557.85	-118049.86	-13159.152
Happiness data			
logGDP	0.172*** (16.59)	0.367*** (38.40)	0.549*** (9.59)
Model Summary			
Observations	65869	59779	6090
LR chi2	18672.25	17227.81	1597.86
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R2	0.1375	0.1405	0.1237
Log likelihood	-58581.244	-52674.481	-5659.5387

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

Table A5.3.2: Cross National Evidence of a Satiation Point in the Well-Being-Income Relationship, Ordered Probit Results with a Cut-Off Level of Per Capita GDP of $25,000

Well-Being-Data	βall and z-stat (1)	β_{rich} and z-stat (2)	β_{poor} and z-stat (3)
Life satisfaction data			
logGDP	0.216*** (32.26)	0.368*** (16.64)	0.135*** (11.14)
Model Summary			
Observations	66221	30969	35252
LR chi2	16043.66	7662.71	6545.85
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R2	0.0575	0.0631	0.0424
Log likelihood	-131557.85	-56891.372	-73827.958
Happiness data			
logGDP	0.283*** (37.52)	0.532*** (21.09)	0.078*** (5.81)
Model Summary			
Observations	65869	30881	34988
LR chi2	18672.25	796.16	8512.03
Prob > chi2	0.0000	0.0000	0.0000
Pseudo R2	0.1375	0.0132	0.1178
Log likelihood	-58581.244	-29717.877	-31886.141

*(Source: Author's own. Dependent variable: Happiness on an ordered scale ranging from "very happy", "quite happy", "not very happy" to "not at all happy"; Life satisfaction on an ordered scale ranging from 1 (dissatisfied) to 10 (satisfied). Significance levels: ***1%, **5%, *10%)*

A4: Do File Chapter 4

Generating Reference and Relative Income

```
local N=_N

 ** Generate empty income reference variable **

generate yref=.
quietly {
   ** Loop over all observations **
forvalues i=1/`N' {
    ** Create temporary flag and income reference variables **
      tempname yref`i' flag`i'
    generate `flag`i''=cond((ageyears>= ageyears[`i']-5 & ///
                          ageyears<= ageyears[`i']+5) & ///
                          Education==Education[`i'] & ///
                          region==region[`i'] ///
                          ,1,0)

 di ageyears[`i']
      egen `yref`i''=mean(absolutincome) if `flag`i''
      qui su `yref`i''
    ** Replace average income for observation `i'=20
      replace yref=r(mean) in `i'
    }
  }

rename  yref referenceincome

gen logreferenceincome =log( referenceincome)
gen  relativeincome= absolutincome - referenceincome
gen logrelativeincome =log(relativeincome)
gen logabsoluteincome =log(absolutincome)
```

Table 4.2: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Absolute Income Being the Primary Independent Variable

**Model 1*
oprobit Happy logabsoluteincome Relvimp Relnimp Relnalimp Healthgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied8 Jobsatisfied9 Male EmpL30 EmpSelf EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther Age17to25 Age36to45 Age46to55 Age56to65 Age66to75 Age76plus SouthWest SouthEast MidWest MidEast West Midland Border

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

**Model 2*
oprobit Satisfiedlife logabsoluteincome Relvimp Relnimp Relnalimp Healthgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied8 Jobsatisfied9 Male EmpL30 EmpSelf EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther Age17to25 Age36to45 Age46to55 Age56to65 Age66to75 Age76plus SouthWest SouthEast MidWest MidEast West Midland Border

*Deriving the Marginal Effects
mfx, predict (p outcome (10))

Table 4.2.1: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Reference Group Income Being the Primary Independent Variable

**Model 1*

oprobit Happy logreferenceincome logabsoluteincome Relvimp Relnimp Relnalimp Healthgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied8 Jobsatisfied9 Male EmpL30 EmpSelf EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther Age17to25 Age36to45 Age46to55 Age56to65 Age66to75 Age76plus SouthWest SouthEast MidWest MidEast West Midland Border

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

**Model 2*

oprobit Satisfiedlife logreferenceincome logabsoluteincome Relvimp Relnimp Relnalimp Healthgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied8 Jobsatisfied9 Male EmpL30 EmpSelf EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther Age17to25 Age36to45 Age46to55 Age56to65 Age66to75 Age76plus SouthWest SouthEast MidWest MidEast West Midland Border

*Deriving the Marginal Effects
mfx, predict (p outcome (10))

Table 4.2.2: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Relative Income Being the Primary Independent Variable

**Model 1*
oprobit Happy relativeincome logabsoluteincome Relvimp Relnimp Relnalimp Healthgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied8 Jobsatisfied9 Male EmpL30 EmpSelf EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther Age17to25 Age36to45 Age46to55 Age56to65 Age66to75 Age76plus SouthWest SouthEast MidWest MidEast West Midland Border

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

**Model 2*
oprobit Satisfiedlife relativeincome logabsoluteincome Relvimp Relnimp Relnalimp Healthgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied8 Jobsatisfied9 Male EmpL30 EmpSelf EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther Age17to25 Age36to45 Age46to55 Age56to65 Age66to75 Age76plus SouthWest SouthEast MidWest MidEast West Midland Border

*Deriving the Marginal Effects
mfx, predict (p outcome (10))

Table 4.4: The Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Happiness and Life Satisfaction on a 4-Point Scale

```
Gen SatlifeFour = .
replace SatlifeFour = 4 if Satisfiedlife == 10
replace SatlifeFour = 4 if Satisfiedlife == 9
replace SatlifeFour = 3 if Satisfiedlife == 8
replace SatlifeFour = 3 if Satisfiedlife == 7
replace SatlifeFour = 3 if Satisfiedlife == 6
replace SatlifeFour = 2 if Satisfiedlife == 5
replace SatlifeFour = 2 if Satisfiedlife == 4
replace SatlifeFour = 2 if Satisfiedlife == 3
replace SatlifeFour = 1 if Satisfiedlife == 2
replace SatlifeFour = 1 if Satisfiedlife == 1


*Model 1
oprobit Happy  logabsoluteincome Relvimp Relnimp Relnalimp Healthgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied4  Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied8 Jobsatisfied9 Male EmpL30 EmpSelf EmpRetired EmpHousewife EmpStudent EmpUnemployed  EmpDisability EmpOther Age17to25 Age36to45 Age46to55 Age56to65  Age66to75 Age76plus SouthWest SouthEast MidWest MidEast West Midland Border

*Deriving the Marginal Effects
mfx, predict (p outcome (4))


*Model 2
oprobit SatlifeFour logabsoluteincome Relvimp Relnimp Relnalimp Healthgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied8 Jobsatisfied9 Male EmpL30 EmpSelf EmpRetired EmpHousewife EmpStudent EmpUnemployed  EmpDisability EmpOther Age17to25 Age36to45 Age46to55 Age56to65  Age66to75 Age76plus SouthWest SouthEast MidWest MidEast West Midland Border

*Deriving the Marginal Effects
mfx, predict (p outcome (4))
```

A4.2: Cut Points of the Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Absolute Income Being the Primary Independent Variable

Table A4.2(a): Model 1 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	-1.641	0.886
cut2	-0.638	0.873
cut3	1.320	0.873

(Source: Author's own)

Table A4.2(b): Model 2 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	0.474	0.767
cut2	0.601	0.764
cut3	0.783	0.761
cut4	1.142	0.758
cut5	1.650	0.758
cut6	2.162	0.760
cut7	2.700	0.763
cut8	3.523	0.766
cut9	4.398	0.769

(Source: Author's own)

A4.2.1: Cut Points of the Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Reference Group Income Being the Primary Independent Variables

Table A4.2.1(a): Model 1 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	-2.765	1.226
cut2	-1.765	1.218
cut3	0.196	1.216

(Source: Author's own)

Table A4.2.1(b): Model 2 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	-0.722	1.073
cut2	-0.593	1.070
cut3	-0.410	1.067
cut4	-0.048	1.064
cut5	0.464	1.062
cut6	0.979	1.062
cut7	1.519	1.064
cut8	2.342	1.066
cut9	3.218	1.068

(Source: Author's own)

A4.2.2: Cut Points of the Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Relative Income Being the Primary Independent Variables

Table A4.2.2(a): Model 1 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	-2.591	1.081
cut2	-1.589	1.071
cut3	0.373	1.069

(Source: Author's own)

Table A4.2.2(b): Model 2 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	0.273	0.946
cut2	0.401	0.943
cut3	0.583	0.940
cut4	0.943	0.937
cut5	1.451	0.936
cut6	1.963	0.937
cut7	2.501	0.940
cut8	3.324	0.943
cut9	4.199	0.945

(Source: Author's own)

A4.4: Cut Points of the Determinants of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Happiness and Life Satisfaction on a 4-Point Scale

Table A4.4(a): Model 1 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	-1.641	0.886
cut2	-0.638	0.873
cut3	1.320	0.873

(Source: Author's own)

Table A4.4(b): Model 2 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	0.734	0.853
cut2	1.833	0.849
cut3	3.694	0.859

(Source: Author's own)

A5: Do File Chapter 5

Figure 5.2.1: Non-Parametric Fit of the Happiness-LogGDP Data

```
reg MeanHappy logGDP
sum logGDP, meanonly

* -lowess- command performes local linear regression and plots its results
lowess MeanHappy logGDP, bwidth(0.8) generate(lowess) nogr
mkspline newvar_1 15000 newvar_2=logGDP
reg MeanHappy newvar_1 newvar-2
predict xb_spl

*Create graph
line lowess logGDP,sort lpattern(dot) lcolor (gs1) || ///
line xb_lin logGDP, sort lpattern(solid) lcolor(gs1) || ///
line xb_spl logGDP, sort lpattern(dash) lcolor(gs1) || ///
scatter MeanHappy logGDP, ///

mlabel(country) mlabsize(tiny)  mlabcolor(gs6)       ///
mcolor(gs1) msymbol(circle_hollow) ///
mlabposition(2) mlabangle(40)                    ///


legend(order( ///
1 "lowess smooth" ///
2 "OLS fit"       ///
3 "Linear spline" cols(3))     ///
title("Happiness: European Values Study 2008 ")                                  ///
note("GDP < 15k: Slope = .119 (5.90)     GDP > 15k: Slope = .676 (51.17)  ")
```

Figure 5.2.2: Non-Parametric Fit of the Life-Satisfaction-LogGDP Data

```
reg MeanlifeSatisfaction logGDP
sum logGDP, meanonly

* -lowess- command performes local linear regression and plots its results
lowess MeanlifeSatisfaction logGDP, bwidth(0.8) generate(lowess) nogr
mkspline newvar_1 15000 newvar_2=logGDP
reg MeanlifeSatisfaction  newvar_1 newvar-2
predict xb_spl

*Create graph
line lowess logGDP,sort lpattern(dot) lcolor (gs1) || ///
line xb_lin logGDP, sort lpattern(solid) lcolor(gs1) || ///
line xb_spl logGDP, sort lpattern(dash) lcolor(gs1) || ///
scatter MeanlifeSatisfaction logGDP, ///

mlabel(country) mlabsize(tiny)  mlabcolor(gs6)       ///
```

```
mcolor(gs1) msymbol(circle_hollow) ///
mlabposition(2) mlabangle(40)                    ///

legend(order( ///
1 "lowess smooth" ///
2 "OLS fit"       ///
3 "Linear spline" cols(3))     ///

title(" Life-Satisfaction European Values Study 2008 ")                                  ///
note(" GDP < 15k: Slope = .087 (4.64) GDP > 15k: Slope = .941(41.32) ")
```

Table 5.3: Cross National Evidence of a Satiation Point in the Well-Being-Income Relationship; Ordered Probit Result

* Model *(1) Life Satisfaction Results*

oprobit Satisfiedlife logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EducPrePrimary EducPrimary EducLowerSec EducPostSec EducTertiary1 EducTertiary2 EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther

*Deriving the Marginal Effects
mfx, predict (p outcome (10))

* Model *(1) Happiness Results*

oprobit Happy logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EducPrePrimary EducPrimary EducLowerSec EducPostSec EducTertiary1 EducTertiary2 EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

* Model *(2) Life Satisfaction Results*

oprobit Satisfiedlife logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EducPrePrimary EducPrimary EducLowerSec EducPostSec EducTertiary1 EducTertiary2 EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if GDP>=15001

*Deriving the Marginal Effects
mfx, predict (p outcome (10))

* Model *(2) Happiness Results*

oprobit Happy logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4

Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EducPrePrimary EducPrimary EducLowerSec EducPostSec EducTertiary1 EducTertiary2 EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if GDP>=15001

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

* Model *(3) Life Satisfaction Results*

oprobit Satisfiedlife logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EducPrePrimary EducPrimary EducLowerSec EducPostSec EducTertiary1 EducTertiary2 EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if GDP<=15000

*Deriving the Marginal Effects
mfx, predict (p outcome (10))

* Model *(3) Happiness Results*

oprobit Happy logGDP logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EducPrePrimary EducPrimary EducLowerSec EducPostSec EducTertiary1 EducTertiary2 EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if GDP<=15000

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

Table 5.4: Within Nation Evidence of a Satiation Point in the Well-Being-Income Relationship; Ordered Probit Happiness Results

* Model *(1) Albania Results*

oprobit Happy logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if studynoc==4783

* Model *(2) Albania Results*

oprobit Happy logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if absoluteincome >=15000 & studynoc==4783

* Model *(3) Albania Results*

oprobit Happy logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if absoluteincome <15000 & studynoc==4783

Table 5.4.1: Within Nation Evidence of a Satiation Point in the Well-Being-Income Relationship; Ordered Probit Life Satisfaction Result

* Model *(1) Albania Results*

oprobit Satisfiedlife logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if studynoc==4783

* Model *(2) Albania Results*

oprobit Satisfiedlife logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if absoluteincome >=15000 & studynoc==4783

* Model *(3) Albania Results*

oprobit Satisfiedlife logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if absoluteincome <15000 & studynoc==4783

Table 5.5: Cross National Evidence of a Satiation Point in the Well-Being-Income Relationship, Happiness and Life Satisfaction on a 4-Point Scale

```
Gen SatlifeFour = .
replace SatlifeFour = 4 if Satisfiedlife == 10
replace SatlifeFour = 4 if Satisfiedlife == 9
replace SatlifeFour = 3 if Satisfiedlife == 8
replace SatlifeFour = 3 if Satisfiedlife == 7
replace SatlifeFour = 3 if Satisfiedlife == 6
replace SatlifeFour = 2 if Satisfiedlife == 5
replace SatlifeFour = 2 if Satisfiedlife == 4
replace SatlifeFour = 2 if Satisfiedlife == 3
replace SatlifeFour = 1 if Satisfiedlife == 2
replace SatlifeFour = 1 if Satisfiedlife == 1
```

* Model *(1) Life Satisfaction Results*

```
oprobit SatlifeFour logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EducPrePrimary EducPrimary EducLowerSec EducPostSec EducTertiary1  EducTertiary2 EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther
```

```
*Deriving the Marginal Effects
mfx, predict (p outcome (4))
```

* Model *(1) Happiness Results*

```
oprobit Happy logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EducPrePrimary EducPrimary EducLowerSec EducPostSec EducTertiary1  EducTertiary2 EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther
```

```
*Deriving the Marginal Effects
mfx, predict (p outcome (4))
```

* Model *(2) Life Satisfaction Results*

```
oprobit SatlifeFour logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EducPrePrimary
```

EducPrimary EducLowerSec EducPostSec EducTertiary1 EducTertiary2 EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if GDP>=15001

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

* Model *(2) Happiness Results*

oprobit Happy logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EducPrePrimary EducPrimary EducLowerSec EducPostSec EducTertiary1 EducTertiary2 EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if GDP>=15001

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

* Model *(3) Life Satisfaction Results*

oprobit SatlifeFour logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EducPrePrimary EducPrimary EducLowerSec EducPostSec EducTertiary1 EducTertiary2 EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if GDP<=15000

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

* Model *(3) Happiness Results*

oprobit Happy logGDP logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EducPrePrimary EducPrimary EducLowerSec EducPostSec EducTertiary1 EducTertiary2 EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if GDP<=15000

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

A5.3: Cut Points of the Cross National Evidence of a Satiation Point in the Well-Being-Income Relationship; Ordered Probit Results

Table A5.3(a): Model 1 Cut Points

Cut Point	Coefficient	Std. Err.
Life Satisfaction Data		
cut1	-0.027	0.076
cut2	0.249	0.076
cut3	0.639	0.076
cut4	0.927	0.076
cut5	1.374	0.076
cut6	1.673	0.076
cut7	2.111	0.076
cut8	2.809	0.076
cut9	3.373	0.076
Happiness Data		
cut1	0.442	0.086
cut2	1.722	0.085
cut3	3.713	0.086

(Source: Author's own)

Table A5.3(b): Model 2 Cut Points

Cut Point	Coefficient	Std. Err.
Life Satisfaction Data		
cut1	0.702	0.149
cut2	0.972	0.149
cut3	1.369	0.149
cut4	1.670	0.149
cut5	2.110	0.149
cut6	2.417	0.149
cut7	2.900	0.149
cut8	3.672	0.150
cut9	4.292	0.150
Happiness Data		
cut1	2.669	0.170
cut2	3.903	0.170
cut3	5.934	0.171

(Source: Author's own)

Table A5.3(c): Model 3 Cut Points

Cut Point	Coefficient	Std. Err.
Life Satisfaction Data		
cut1	-1.590	0.198
cut2	-1.300	0.198
cut3	-0.910	0.197
cut4	-0.634	0.197
cut5	-0.163	0.197
cut6	0.132	0.197
cut7	0.499	0.197
cut8	1.042	0.197
cut9	1.484	0.198
Happiness Data		
cut1	-1.441	0.220
cut2	-0.070	0.219
cut3	1.883	0.220

(Source: Author's own)

A5.5: Cut Points of the Cross National Evidence of a Satiation Point in the Well-Being-Income Relationship, Happiness and Life Satisfaction on a 4-Point Scale

Table A5.5(a): Model 1 Cut Points

Cut Point	Coefficient	Std. Err.
Life Satisfaction Data		
cut1	0.321	0.081
cut2	1.448	0.081
cut3	2.867	0.082
Happiness Data		
cut1	0.442	0.086
cut2	1.722	0.085
cut3	3.713	0.086

(Source: Author's own)

Table A5.5(b): Model 2 Cut Points

Cut Point	Coefficient	Std. Err.
Life Satisfaction Data		
cut1	1.053	0.162
cut2	2.194	0.162
cut3	3.740	0.163
Happiness Data		
cut1	2.669	0.170
cut2	3.903	0.170
cut3	5.934	0.171

(Source: Author's own)

Table A5.5(c): Model 3 Cut Points

Cut Point	Coefficient	Std. Err.
Life Satisfaction Data		
cut1	-1.572	0.209
cut2	-0.436	0.209
cut3	0.763	0.209
Happiness Data		
cut1	-1.441	0.220
cut2	-0.070	0.219
cut3	1.883	0.220

(Source: Author's own)

A6: Do File Chapter 6

**** Table 6.2: The Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - All European Citizens***

**Model 1*
oprobit Happy Gini logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

**Model 2*
oprobit Satisfiedlife Gini logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther

*Deriving the Marginal Effects
mfx, predict (p outcome (10))

**** Table 6.3: The Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Poor European Citizens***

**Model 1*
oprobit Happy Gini logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if absoluteincome <=15000

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

**Model 2*
oprobit Satisfiedlife Gini logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed EmpDisability EmpOther if absoluteincome <=15000

*Deriving the Marginal Effects
mfx, predict (p outcome (10))

Table 6.4: The Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Rich European Citizen

**Model 1*

```
oprobit Happy  Gini logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed  EmpDisability EmpOther if absoluteincome >=15000

*Deriving the Marginal Effects
mfx, predict (p outcome (4))
```

**Model 2*

```
oprobit Satisfiedlife Gini logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed  EmpDisability EmpOther if  absoluteincome >=15000

*Deriving the Marginal Effects
mfx, predict (p outcome (10))
```

Table 6.6: The Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Happiness and Life Satisfaction on a 4-Point Scale

```
Gen SatlifeFour = .
replace SatlifeFour = 4 if Satisfiedlife == 10
replace SatlifeFour = 4 if Satisfiedlife == 9
replace SatlifeFour = 3 if Satisfiedlife == 8
replace SatlifeFour = 3 if Satisfiedlife == 7
replace SatlifeFour = 3 if Satisfiedlife == 6
replace SatlifeFour = 2 if Satisfiedlife == 5
replace SatlifeFour = 2 if Satisfiedlife == 4
replace SatlifeFour = 2 if Satisfiedlife == 3
replace SatlifeFour = 1 if Satisfiedlife == 2
replace SatlifeFour = 1 if Satisfiedlife == 1

*Model  1
oprobit Happy Gini logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed  EmpDisability EmpOther

*Deriving the Marginal Effects
mfx, predict (p outcome (4))

*Model 2
oprobit SatlifeFour Gini logGDP logabsoluteincome Age15to25 Age26to35 Age46to55 Age56to65 Age66to75 Age76plus Relvimp Relnimp Relnalimp Healthvgood Healthfair Healthpoor Healthvpoor Jobdissatisfied Jobsatisfied2 Jobsatisfied3 Jobsatisfied4 Jobsatisfied5 Jobsatisfied6 Jobsatisfied7 Jobsatisfied9 Jobsatisfied Male RegisteredPartnership Widowed Divorced Separated NeverMarried EmpL30 EmpSelf Military EmpRetired EmpHousewife EmpStudent EmpUnemployed  EmpDisability EmpOther

*Deriving the Marginal Effects
mfx, predict (p outcome (4))
```

A6.2: Cut Points of the Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - All European Citizens

Table A6.2(a): Model 1 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	2.455	0.220
cut2	3.789	0.220
cut3	5.855	0.221

(Source: Author's own)

Table A6.2(b): Model 2 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	-0.520	0.193
cut2	-0.216	0.193
cut3	0.189	0.192
cut4	0.491	0.192
cut5	0.942	0.192
cut6	1.257	0.193
cut7	1.751	0.193
cut8	2.542	0.193
cut9	3.195	0.193

(Source: Author's own)

A6.3: Cut Points of the Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Poor European Citizens

Table A6.3(a): Model 1 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	1.723	0.436
cut2	3.143	0.436
cut3	5.097	0.437

(Source: Author's own)

Table A6.3(b): Model 2 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	-0.454	0.390
cut2	-0.121	0.390
cut3	0.301	0.390
cut4	0.606	0.391
cut5	1.097	0.391
cut6	1.415	0.391
cut7	1.845	0.391
cut8	2.479	0.391
cut9	2.986	0.391

(Source: Author's own)

A6.4: Cut Points of the Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Rich European Citizen

Table A6.4(a): Model 1 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	2.382	0.304
cut2	3.591	0.303
cut3	5.733	0.304

(Source: Author's own)

Table A6.4(b): Model 2 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	-1.122	0.263
cut2	-0.863	0.263
cut3	-0.475	0.262
cut4	-0.172	0.262
cut5	0.250	0.262
cut6	0.568	0.262
cut7	1.110	0.262
cut8	1.978	0.262
cut9	2.692	0.262

(Source: Author's own)

A6.6: Cut Points of the Determenents of Individual Happiness and Life Satisfaction Using an Ordered Probit Model - Happiness and Life Satisfaction on a 4-Point Scale

Table A6.6(a): Model 1 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	2.455	0.220
cut2	3.789	0.220
cut3	5.855	0.221

(Source: Author's own)

Table A6.6(b): Model 2 Cut Points

Cut Point	Coefficient	Std. Err.
cut1	-0.039	0.210
cut2	1.123	0.210
cut3	2.701	0.211

(Source: Author's own)